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Clear, David (2017) *Managing sudden phase transitions in complex adaptive systems: lessons from the financial crisis*. MPhil(R) thesis

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Managing Sudden Phase Transitions in Complex Adaptive Systems: Lessons from the Financial Crisis

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Masters of Philosophy

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April 2017

Abstract

Following a period of almost unbroken growth from 1998 to 2007 the Global Financial System suffered a catastrophic collapse between late 2007 and end of 2008 (Wray 2009, 2010). Bank share prices collapsed across the US and EU and the direct and collateral impacts were felt globally. The impacts of the crisis rapidly spread into the real economy and a deep recession began (Wray 2009, 2010). In the years prior to the Financial Crisis various complex products and risk management processes had been developed resulting in both a misplaced sense of confidence in the stability of the industry, and the development and incubation of a number of dangerous weaknesses at its core. As conditions changed these risks began to crystalise and rapidly move through gaps in defences of various institutions. The impacts were both swift and dramatic. How had an industry which had experienced numerous systemic events in the past allowed another crisis to develop unseen, and how were so many stakeholders unable to respond to the rapid change in their industry?

Utilizing Kaufmann's (1996) Fitness Landscape Theory to frame the financial industry as a complex adaptive system, this research assesses the evolution of the industry in the years prior to the Financial Crisis and how risk was able to build up unseen within the industry, examines the responses of 3 financial institutions during the Financial Crisis for evidence of their ability to adapt to changed environmental conditions. This research identifies the weaknesses and strengths within the three case studies and identifies structures and communication processes which could limit exposures to future phase transitions and improve decision making under strained conditions.

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Acknowledgements

I am extremely grateful to my supervisors Prof Denis Fischbacher-Smith and Prof Robert McMaster for their help, support and patience with me during this process. They were always willing to help and offer feedback throughout the process, and were very understandable at all the twists and turns this process took along the way. Thank you to you both for all of the help you have provided one of your more errant students.

Additionally, I would like to acknowledge the interview candidates who gave of their time freely to help me in this project. I also need to specifically thank Gordon Fischbacher for providing industry knowledge, and facilitating a number of interviews for me.

Finally, I must thank my family for their patience through this (longer than planned) process. My wife Kathryn, who has endured two emigrations and three children during the span of this thesis. I am forever grateful for your support and patience, this would not have been possible without you. To Conor, Isla and Sorcha - go raibh maith agaibh. I can't imagine you'll ever read further than here, but should I hope you notice all the errors.

Thank you all

David Clear

August 2017

Authors' Declaration

I declare that, except where explicit reference is made to the contribution of others, that this dissertation is the result of my own work and has not been submitted for any other degree at the University of Glasgow or any other institution.

David Clear

David Clear

1 Introduction

Note: The term 'Financial Crisis' refers to the events within financial markets from approximately 2007 - 2008 and the subsequent recession. The first waves were seen in 2007, initially with problems faced by Northern Rock in the UK and Paribas BNP in France, but for many the major tipping point was the collapse of Lehmann Brothers in September 2008 and knock on effects seen throughout the global economy.

Following a period of almost unbroken growth from 1998 to 2007 the Global Financial System suffered a catastrophic collapse between late 2007 and end of 2008 (Wray 2009, 2010). Bank share prices collapsed across the US and EU and large impacts were felt globally. The impacts of the crisis spread into the real economy as deep recession began. In Ireland GDP fell by over 10% and unemployment rose from less than 4% to almost 15% (McWilliams 2009, Nyberg 2011). EU and IMF led bailouts were required in Ireland and Greece to rescue crashing economies (Honohan 2010). The estimated cost to the US economy is between \$13 - 22 trillion (GAO 2013, Claessens and Van Horen 2014). Numerous reports have been generated examining how this collapse came to be and how it can be avoided again. There has been an acknowledgement that the Financial Industry has grown to be of systemic importance to the wider economy and should be considered as part of the critical infrastructure "essential to the country's defence and economic security and to the health and welfare of its citizens (President's Commission 1997). Updated legislation has been developed in the UK, the US, The EU to limit the growth of organisations and ensure sufficient buffers in place for financial institutions to respond to similar shocks and to have a 'living will' in place to ensure they have a wind up process in place to limit the chances of a repeat of Lehman Brother's collapse.

This research looks at the events which preceded the Financial Crisis, explores how many of the stakeholders developed a misplaced confidence in the security and safety of the system and allowed risk to incubate in the system and permit individual players to grow to systemic importance to the wider industry. It further assesses how individual organisations reacted to the sudden changes in the environment which required many people to adjust their world view of what was possible, and finally what changes have been made by both individual players and the industry as a whole. The goal is not to review the causes and identify changes which should be made within the financial industry, rather than to assess how individuals operate within complex environments and how people and organisations adapt to a dramatic shift in the environment they are operating in and attempt to either salvage the organisation, or in certain

cases to take advantage of a competitive advantage in these new circumstances and to prosper from them. What lessons can be learned from the experiences of the individual organisations who were caught up in these challenged circumstances which can be utilized in other industries to either insulate companies from unexpected shocks, or to allow them to be positioned to take advantage of the difficulties faced by competitors.

If organisations are unwilling to examine the errors of others and assess their own exposure to risk they leave themselves open to further threats of crisis. The Financial Crisis has emphasised the interconnected level of organisations and industries and how quickly crises can spread between them. Risks within this industry, and many others have been shown to be ‘a borderless phenomenon’ (Smith and Fischbacher 2009; p.3), as is their exposure to it if suitable precautions are not taken. There is no organisation operating in a hazardous environment in any domain that is not vulnerable to crises (Reason et al, 2001). It has further been stated that crises are somewhat inevitable over the course of an organisation’s growth and evolution (Grenier 1972).

Crises generally originate by a failure of people, organisational structures, economics or technology, or by natural disasters. These events often result in losses of human life and / or resources and result in damage to the financial well-being and reputation of the organisation (Elsubbagh, Fildes and Rose 2004). Organisations need to be vigilant against potential crisis events to limit both their occurrence and their frequency, but also cognizant that it is impossible to manage all risk out of their system, and at a certain point will face strained conditions. Many major crises, disasters or company failures have initially been blamed on the errors or failures of front line individuals (Smith, 1992, Vaughan, 1997). Whilst it is sometimes the case the error can be attributed to the actions of a single agent, in many cases, subsequent investigations can show systematic organisational errors that are major contributory factors to these events. Organisations must be conscious of this factor if they want to learn from their or other’s previous mistakes because ‘there are specific causes in team errors that will not be revealed by an exclusive emphasis on the errors of individuals’ (Sasou and Reason 1999).

As an organisation becomes more complex information and decision are filtered through an increasing number of groups, and often locations. Low probability, high consequence risks are the usual causes of crises and are often the result of emergence, which is ‘the process by which the interaction between elements generates unforeseen properties or outcomes of low probability of occurrence’ (Smith 2005: p. 4). This issue was notable in the decision to launch

the Challenger shuttle in 1986 following a teleconference between NASA staff and Morton Thiokol engineers based in three space locations (Fisher and Kingma 2001). These increased interactions generate emergent patterns that cannot be predicted (Burton 2002). These emergent issues are by their nature outside of the experience base of the organisation's management structure and are often characterised by early warnings and weak signals that are not recognised or reported within a complex organisation.

This thesis is focused on the causes and impacts of the Financial Crisis, the reactions to it both in the immediacy of the events and in the aftermath when more measured and focused responses were possible. 'Banking crises are initiated by deregulatory measures, which lead to overly rapid credit expansion. This in turn increases asset prices, which are unwarranted by fundamentals (a 'bubble'). At some point the bubble bursts, with a dramatic fall in prices and disruption of the asset markets (in particular for real estate) and widespread bankruptcies. This is accompanied by an increase in non-performing loans, credit losses, and acute liquidity problems within the banking system. Finally, governments have to bail out the weak banking system by large-scale recapitalization and nationalization operations' (Klomp, 2010, p 73). Minsky's (1992) Financial Instability Hypothesis elaborates on this point, outlining how the financial industry operates through a cycle of 3 stages, Hedge, Speculative, and Ponzi, where investors attitude transition from caution through to euphoria which inevitably result in a crash. Kauffman's (1993, 1996) work on the Fitness Landscape offers a similar description of adaptive ecosystems operating in a stable then complex manner. As organisms within the environment become more adapted to the specific traits required in this landscape they can also reduce their own resilience and adaptiveness. Further changes in the environment can lead to a transition to a chaotic situation, and organisms scramble to adapt to these sudden changed conditions. Both of these theories offer a similar lens to view the circumstances leading to the Financial Crisis, as well as the reactions by agents within the system to a chaotic environment, and finally the changes made to both the system and the individual organisations within it.

This research aims to assess the causes of and responses to the Financial Crisis and to examine how to manage sudden phase transitions in complex systems. In doing this the researcher aims to:

1. Assess to what extent is the banking crisis a function of internal fitness or external threats?

2. Explain how selected firms in the financial services industry evolved to a particular set of environmental conditions, but were unable to adapt to a sudden and dramatic shift in these conditions.
3. Examine the changes made within the financial industry generally, and specifically in relation to selected firms, following the commencement of the financial crisis and explore whether the system has developed resilience to future unexpected environmental changes.

The following chapter offers a more detailed review of the contributing factors to the Financial Crises and identifies various internal and external factors which impacted the evolution of the industry. Increased complexity within the industry was a clear contributory factor. Financial institutions grew larger and merged. Operating across multiple jurisdictions increased their exposure to a wider array of potential shock events. Products developed and sold in the industry became increasingly complex, and many institutions did not have an accurate understanding of their exposures. While this offered opportunities to earn large profits in a booming economy, it quickly became apparent that companies were less flexible and responsive under challenging conditions.

Chapters 3-5 review existing literature in the areas of Crisis Management, Organisational Learning and provides an outline of the Fitness Landscape Theory from evolutionary biology to be used as a lens to view the changes in the financial industry prior to the events of 2007 / 2008 and the adjustments made in the aftermath of the Financial Crisis, by individual organisations and the wider industry. Chapter 6 provides an outline of the methodology utilized in this research and an overview of the combination of primary and secondary sources utilised by the researcher.

Chapter 7 will provide an analysis of three financial institutions who were deeply impacted by the events of the Financial Crisis: Anglo Irish Bank (Anglo), Royal Bank of Scotland (RBS) and Santander UK. An assessment of how these institutions evolved in the period preceding the Financial Crisis, and how they adapted to the sudden phase transitions within the system. These three institutions fared very differently during the period in question and subsequently and their experiences, strategies and decision making structures prior to and during the events of the Financial Crisis will be reviewed.

Chapter 8 offers the researcher's summary of the evolution of this industry both prior to, during and following the Financial Crisis. An assessment of the impact of strategic choices made prior

to the Financial Crisis, the impacts these decisions had on their ability to adapt to a rapidly changing environment is provided. Finally, a review of the changes made by individual institutions, and the environment itself, is outlined.

2 Causes of the Financial Crisis

2.1 Introduction

The period between 1998 and mid 2007 witnessed almost unbroken growth in the global financial industry, share prices of banks increased by almost 60%, while at the same time their balance sheets rose more than threefold (Haldane 2009). Global financial assets rose from US\$12 trillion in 1980 to US\$196 trillion in 2007 (McKinsey 2008). Between 1986 and 2006 the US Financial sector increased their share of commercial profits from 10% of the total to 30%, while at the same time their level of outstanding debt grew from 20% of GDP to 116% (FED 2009). However, prior to the crash there appeared to be a belief within the industry that it would be different this time. Gordon Brown, then Chancellor of the Exchequer, claimed that fiscal stability was his goal and made frequent references to the cycle of boom and bust having been consigned to the past due to policy's implemented on his watch (Guardian 2011). The Bank of England's Financial Stability Report, published in July 2006, noted that the UK financial system remained profitable and resilient to potential future disturbances. It further noted that risks associated with key vulnerabilities remained remote (Haldane 2009a). Ben Bernanke (2004), then Head of the Federal Reserve, discussed how better monetary policy had led to reduced macroeconomic volatility resulting in the period referred to as The Great Moderation.

The financial crisis which first became apparent in summer 2007 has been referred to as the 'greatest crisis for at least a century, indeed arguably the greatest crisis in the history of the finance capitalism' (Turner 2009, p. 5). Greenspan (2010 p.17) described it as a financial crisis 'without historical precedent'. Wray (2009 p. 824) stated that was if the economy had 'fallen off a cliff'. Lord Turner, Chairman of the FSA in his review of the financial crisis highlighted that in 1986 Minsky argued 'financial markets and systems are inherently susceptible to speculative booms which, if long lasting, will inevitable end in crisis' (Turner Review 2009, p.40).

While the trigger for the crisis was common exposure to a particular class of assets, the US sub-prime mortgages simply acted as the match that lit the fuse on the combustible mix of long-term illiquid dollar denominated assets financed by a combination of short-term dollar liabilities and foreign currency swaps (Cecchetti et al, 2010). This was compounded by a widespread loss of confidence in the creditworthiness of banks (Allen and Moessner, 2010).

Blame has been laid at the doors of individual institutions, regulatory bodies, rating agencies and governments (Kelly 2005, Turner 2009, Nyberg 2010, Honohan 2010). The crisis was not caused by the collapse of the sub-prime market in the US. The value attributed to foreclosures and write downs in this market was a few hundred billion dollars which was minor relative to the wider financial market. It did however lead to uncertainty and a loss of confidence as traders were unsure what assets may turn toxic next and which institutions were likely to be exposed (Sassen, 2013)

Wray (2009, p. 826) described it as 'a crisis of the money manager system'. The crisis exposed the inherent weaknesses in the system and vulnerabilities in banks' balance sheets that was masked by the incredible profits that were posted in the preceding years (Tregenna 2009). Crotty (2009, p. 564) acknowledged the subprime issues as the trigger event but felt the underlying causes to be the 'flawed institutions and practices of the current financial regime'. The growth in volume and in systemic importance of the derivatives market was highlighted as a future problem (BBC 2004). Warnings were raised relating to booming asset prices, particularly in the housing market and construction industries (McWilliams 2002, Kelly 2005). The trading of complex financial products and nature of remuneration within the financial industry was also flagged as a potentially destabilising factor (Rajan 2005). These fragilities developed unnoticed, weakening industry resilience simply waiting for a trigger (Wray 2009).

A systemic financial crisis results from a number of agents, financial institutions; regulatory bodies; and individual actors, collectively following unsound practices and policies (Nyberg 2011, p. 1). In October 2009 Adair Turner, Chairman of the FSA stated: 'We have to recognise that what occurred was not just a crisis of specific institutions and a failure of specific regulations, but a crisis for the entire intellectual theory of efficient, rational and self-equilibrating markets' (Turner 2009, p. 2). As these conditions were fermenting, a number of people attempted to highlight the build-up of these problems in the system (Keen 2001, Large 2004, Rajan 2005). Keen (2011 p. 1) stated that the crash was not only predictable 'but an almost blindingly obvious certainty'. In spite of these warnings people in positions of power, within government, regulatory bodies and financial institutions failed to stop these events from unfolding, and in most cases failed to even mitigate against them (Wray 2009, Nyberg 2011, Haldane 2009). The industry had a similar experience in 1987 when the financial markets crashed at a rate never before seen. The financial industry, its agents, investors and regulators failed to learn that these crisis events such as these are eminently predictable but almost impossible to predict accurately (Taleb et al. 2009).

How could a crisis of this magnitude, in an industry supposedly under heavy scrutiny by regulators and the general public, have been allowed to incubate within the financial system? Widespread discussions and investigations in the wake of the crash have highlighted a number of contributing factors. There follows a discussion of the main factors that contributed to the rapid growth and even quicker collapse of financial industry.

2.2 Causes of the Financial Crisis

A number of contributing factors have been identified as contributing to the incubation and crystallisation of the Financial Crisis. Below the primary contributory factors are discussed in more detail.

2.2.1 Globalisation

‘The scale and interconnectivity of the international financial network has increased significantly over the past two decades.....the network has become more dense and complex’ A small world is more likely a local problem into a global one’ (Haldane, 2009, p.11)

Klomp (2010, p.83) in assessing causes common to a variety of financial crises found that a rise in globalisation ‘significantly increases the likelihood of a banking crisis’. The effects of previous financial crisis, such as the Asian crisis in the 1990s and Argentina in 1991, had a limited effect on the wider world. In contrast, the impact of the financial crisis that originated in 2007 has been much more widespread (Lane 2012). Globalisation promoted growth in international financial markets but also promoted deregulation as territories aimed to offer better returns and to attract investment from major corporations (Wray 2005). Cross-border flows of capital more than doubled from 2002 to 2007, by which time foreign investors held one in four debt securities and one in five equities (Blankenburg and Palma 2009). With the success of these investments the global financial market grew increasingly large relative to the non-financial economy. The rise in cross-border trade between financial organisations contributed to the growth of the asset-backed securities market in the United States and spread exposure throughout a wider area. This further allowed the balance sheets of many organisations to expand rapidly. Globally active banks grew in size and complexity increasing the risk exposure of large organisations, local banks had access to international credit markets which allowed them to increase lending within local markets, fuelling asset price growth. As a result of these

factors emerging financial markets grew in importance allowing a build-up of further weaknesses. (Lane, 2012).

The decades preceding the onset of the crisis saw a dramatic increase in the density and complexity of interconnection within the global financial network; the rise in systemic importance of a small number of financial hubs with multiple spokes into the wider economy; and development of a smaller world as the path length in the financial network shrank. This combination of factors was an ‘unholy trinity’ giving rise to a system that was ‘susceptible to a loss of confidence in the key financial hubs and with rapid international transmission of disturbances’ (Turner 2009, p. 12). Financial products grew more complex and opaque as they were traded by a range of international financial institutions and leverage across the global system increased dramatically (Crotty, 2009). The increased prevalence of these complex products fuelled asymmetries in the global market amplifying the effects of the downturn in certain areas (Lane 2012, p. 17). The end result of this evolution of the global financial market was that in addition to being too-big-to-fail, many of these large organisations “were also too inter-connected to ignore” (Tett 2009, p. 263).

2.2.2 Complexity

‘I’ve got some fairly heavy background in mathematics, but some of the complexities of some of the instruments that were going through CDOs bewilders me. I didn’t understand what they were doing or how they actually got the types of returns out of the mezzanines and the various tranches of the CDO that they did. And I figured if I didn’t understand it and I had access to a couple hundred PhDs, how the rest of the world is going to understand it sort of bewildered me’ (Alan Greenspan, former chairman of the Federal Exchange, quoted by Sorkin, 2009, p. 90).

Schwarz (2009) referred to two separate types of complexity that contributed to the financial crisis. The first was ‘cognisant complexity’ where things are just too complicated to understand, even for the chairman of the Federal Exchange. The increasingly complex products that were developed within the financial industry became increasingly complex and opaque and became increasingly difficult to understand the intricacies of an individual deal, but almost impossible to understand the counterparty risk involved in any transaction. The second was ‘temporal complexity’ where the system moves too quickly to be understood. These can create

tight coupling within a system and allow an error to rapidly move into a crisis situation. Complex products were developed and sold throughout the global financial market, and complex risk measurement techniques provided reassurance that exposures were limited. Massive profits were made by both institutions and individuals, breeding confidence in the stability in the market. As problems arose it became apparent that many of these aspects of the system were not fully understood and confidence was misplaced. The virtuous cycle rapidly become a vicious circle (Haldane 2009).

High frequency trading (HFT) began to dominate trading of equities, futures and foreign exchange. According to Haldane (2012), the average time to execute a trade in the 1970s was approximately ten minutes, by the 1990s this had reduced to two minutes, the growth of HFT dropped that figure to approximately 250 microseconds. These tools were used across geographic borders spreading risks created by complex algorithms underpinning the 'decisions' (Corcoran 2013, p.28/29). The complex theories and metrics generated actually changed the financial system itself. Large financial institutions began to calculate their 'exposure' with the algorithms, and use this information to further leverage their assets or justify marketing particular products. As the 'success' of these approaches became apparent, the practice spread throughout the industry resulting in massive growth in both the size and importance of the derivatives market (Morgan, 2013, Tett, 2010).

2.2.3 Complex products

One of the primary causes attributed to previous financial crises was that risk was too concentrated. Securitisation grew in popularity from the 1980s and was seen as a way to limit the risk exposure of individual institutions. Techniques used to package these debts became increasingly complex and when the crisis broke it became apparent that most of the risks remained on the bank's balance sheets 'but in a much more complex and less transparent fashion' (Turner, 2009, p. 16). Innovative financial products such as Credit Default Swaps (CDS), Collateralised Debt Obligations (CDOs) and Mortgage Backed Securities (MBS), often run through Structured Investment Vehicles (SIVs) which had limited links to their parent banks, were thought to spread risk across the whole market. There was an acceptance that these 'financial wizards' had conjured a way of making vast profits with no or very small risks attached (Sorkin 2009, p.13).

The explosion of popularity of these complex and opaque products masked the build-up of systemic risk in the market as a whole (Haldane, 2012). Banks became convinced of the safety of these assets and began to stockpile them and claim them as assets that were held for trading. Also, in order to demonstrate to customers how safe and desirable these CDOs and other products were many banks would purchase the riskiest portions of them. The capital requirements for assets was considerably lower than that of loans as the assumption was they would not be on the books for an extended period of time. However, these were illiquid, risky assets that were expected to pay off in the long term but whose price could plummet in a crisis (Crotty, 2009, p. 568). Turner (2009) highlighted the growth of the financial sector, and particularly the securities market, as one of the factors that put increased pressure on the wider economy when the crisis began. There was a widespread assumption and acceptance amongst bankers, economists, regulators and politicians that the increased technical sophistication within the financial system would result in a safer and more stable economy (Hancock and Zahawi 2011). Over reliance on complex products in an increasingly tightly interconnected financial system created vulnerable pathways that increased systemic risk (Crotty 2009).

The success of these products led to a massive growth in the securities market. The value of which increased dramatically throughout the 1990s and early 2000s (Tett 2009). As a result of the complexity involved in these products the attempts to calculate the level of risk exposure was almost impossible. A CDO was generally made up of over 100 MBS, and each MBS could contain more than that 1000 individual mortgages. A CDO squared was created using multiple CDOs (Crotty 2009, Wray 2009, Tett, 2010). To accurately calculate the risk associated with an individual CDO could take a high powered computer several days, accurately calculating the risk of associated with a CDO squared was effectively impossible (Crotty 2009, Roubini 2008). In addition to this so many different financial institutions were involved with either the creation of, or trading of, these various complex products that it became almost impossible for anyone to know what the counterparty risk was when trading with each other (Wray 2009). All of these issues came to the fore when the crisis hit in 2007 and confidence in these complex products vanished. The global issuance of CDOs fell from \$177 billion in the first quarter of 2007 to less than \$20 billion in the same period of 2008 (Crotty 2009).

Some individuals did argue that these developments were creating as many issues as they were solving. Large (2004) noted that in spite of the benefits provided by new products and systems in use that there was increasing opacity within the system as a result of the levels of complexity

and speed of movement within the system. Rajan (2005) claimed that greater financial risks were being created by these systems and that ‘it is possible these developments may create more financial sector induced pro-cyclicality than the past. They also may create a greater (albeit still small) probability of a catastrophic meltdown’ (Rajan 2005, p.318). An editorial in the Financial Times in 2008 noted that increased complexity can actually increase the danger that one small part of the financial system can cascade through the whole system (Financial Times 2008). Warren Buffet went as far as describing derivatives as ‘financial weapons of mass destruction’ which carried potentially lethal dangers (BBC 2004).

2.2.4 Over-reliance on Flawed Metrics

‘The model was wrong. Of course, all models are wrong. The only model that is not wrong is reality and reality is not, by definition, a model.....They failed Keynes’ test - that it is better to be roughly right than precisely wrong. With hindsight, these models were both very precise and very wrong (Haldane, 2009, p.1)

The core industry perspective toward risk management was led by the various Basel Accords reached by the Bank for International Settlements (Basel II 2004). Haldane (2012) discusses the difference between the provisions of the Basel I agreement with the more detailed checks required under Basel II and Basel III. The first Basel agreement was 30 pages long and included only five different risk weightings. It was to be used as a guide and to support the individual risk management techniques used by financial organisations. Its simplicity allowed for calculations ‘using pad and pen’. The Basel II agreement was considerably more detailed, 347 pages, and complex. Risk exposures and risk weights were considerably more detailed, and ‘thousand, perhaps tens of thousands’ of parameters were required to be estimated and calibrated for these calculations to be conducted. Haldane believes this complexity increased opacity and actually reduced regulatory robustness. The financial crisis unfolded just as the Basel II framework was coming into force and it was almost immediately outdate. The Basel III framework, agreed upon in 2010, attempted to correct these issues and contained even more detail in its 616 pages. De Grauwe (2008) notes further problems with these agreements arguing that there is an implicit assumption of efficiency in financial markets which allows for standardised models to calculate the required capital ratios to minimise risk, ‘this is unworkable because of the tail risks associated with bubbles and crashes that cannot be quantified.

An over-reliance on sophisticated models used to predict risk also added to the problems. Value-at-Risk (VaR) was used within the industry and by regulators to calculate risk exposures based on historical data. Questions remained over the validity of it as a measurement but it was used to assure and justify the ongoing recklessness of many institutions (Wray 2009). Large (2004) explains how models can be a very valuable tool in financial risk management, but also highlighted the limitations inherent in them. They are only as good as the assumptions on which they are based and, when used in isolation, they can provide false reassurance to investors and regulators. Crotty (2009) outlines how the VAR model was inherently flawed when estimating risk. The standard practice was to use data from the previous year, but in boom times the VAR model will show minimal risk, requiring the banks to set aside limited capital against their investments. This low level of volatility might actually be an indication of low risk-aversion. In this case the VAR calculations are hiding a build-up of systemic risk. Alternatively using data from previous decades will include previous crisis events, but the fundamentals of markets can have changed significantly in the intervening period meaning the calculations are again of limited relevance.

A speech made by Andrew Haldane (2009, p.1) of the Bank of England quoted David Viniar the CFO of Goldman Sachs as saying: 'We are seeing things that were 25-standard deviation moves, several days in a row'. Haldane further explains that a 25-sigma event should occur once every '6 x 10¹² lives of the universe'. Tett and Gangahar (2007) quote a hedge fund manager as saying 'People say these are one-in-a-100,000 year's events but they seem to happen every year'. The events of 2007 and 2008 showed the flaws in these models. October 2008 saw massive volatility on the markets and 'once in a lifetime' type variations were seen on a number of consecutive days. The models that had been used were shown to have "massively underestimated the actual risk" (Greenspan 2010, p.17). The industry 'mistook beauty clad in impressive looking mathematics for truth' (Krugman 2009, p. 1).

A further problem highlighted by Large (2004) was the ubiquity of these models use throughout the industry. If all organizations are using similar models, with similar rules and calculated using similar data then they all react similarly to a change in market conditions. This common reaction could amplify the impacts of the environmental change and trigger further liquidity difficulties within the industry. 'Mathematical sophistication ended up not containing risk, but

providing false assurance that other prima facie indicators of increasing risk (rapid credit extension and balance sheet growth) could be safely ignored' (Turner 2009, p.22).

The most frequently used tool by Central Banks in to maintain price stability was the Taylor Rule (Taylor 1993). This framework is based on historical datasets and essentially assumes a closed system of consistent conjunctions between its components. Effectively this approach assumes that the past is a good guide to explaining the present and predicting the future and assumes a certain stability within a closed system. So 'the way the past, present, and future are perceived through the model is at odds with the actual dynamic nature of the economy the approach is intended to represent and manage'. (Morgan, 2013, p.744).

2.2.5 Deregulation and poor enforcement of regulation.

'Financial markets were not just lightly regulated, such regulation as did exist was often 'phantom' regulation - ineffective by design' (Crotty 2009, p.572). Financial institutions in the United States were allowed to choose their own regulatory supervisor (Financial Crisis Inquiry Commission Report, 2011) and to set their own capital requirements (Crotty 2009). The nature of the stress testing required by Basel II regulations would take months to conduct accurately, so they are effectively useless under extreme conditions. This resulted in financial institutions managing the regulation rather than managing risk (Haldane, 2009). Greenspan (2010 p. 16) explains that capital and reserve requirements set by central banks are not sufficient to weather these once or twice a century events that threaten national and international financial systems. There is an implicit admission that during events of this magnitude central banks will offer assistance to stricken financial institutions. The Financial Crisis Inquiry Commission Report (2011 p. xviii) concluded that 'widespread failures in financial regulation and supervision proved devastating to the stability of the nation's financial markets'.

'Banking crises are initiated by deregulatory measures, which lead to overly rapid credit expansion. This in turn increases asset prices, which are unwarranted by fundamentals (a 'bubble'). At some point the bubble bursts, with a dramatic fall in prices and disruption of the asset markets (in particular for real estate) and widespread bankruptcies. This is accompanied by an increase in non-performing loans, credit losses, and acute liquidity problems within the banking system. Finally, governments have to bail out the weak banking system

by large-scale recapitalization and nationalization operations' (Klomp, 2010, p. 73).

From the 1970s the efficient market paradigm led to a push toward deregulation and a number of concessions were made through the 1980s and 1990s. The efficient market paradigm claimed that markets efficiently allocate capital towards the most promising opportunities, resulting in the maximisation of welfare. Bubbles and crashes do not occur as asset prices accurately reflect fundamentals. As a result of these factors financial markets are capable of self-regulation and any government / regulatory interventions could decrease the market efficiency (De Grauwe, 2008). The Glass-Steagall Act introduced in the USA in 1933 in order to reduce the likelihood of a repeat of the Wall Street Crash of 1929. This act separated investment banks and commercial banks, stopping the use of depositors money for investment purposes, in order to limit the potential exposure of individual institutions and the wider industry. The repeal of the remaining portions of the Glass-Steagall act in 1999 allowed commercial banks to enter the same markets as investment banks and hard earned lessons were forgotten (De Grauwe 2008).

Williams (2010) summarise the gradual repealing of the Glass-Steagall Act in the US.

- The act, introduced after the Wall Street crash of 1929, barred commercial banks from engaging in securities underwriting.
- Commercial banks were lobbying since the 1960s for its repeal
- December 1986 the Federal Exchange reinterpreted Section 20 of the Act, allowing commercial banks to engage in investment banking as long as these activities did not exceed 5 per cent of gross revenues.
- By March 1987 the Fed suggested a willingness to extend this to 10 per cent, this was confirmed in 1989.
- January 1989 the scope of underwriting was expanded further after lobbying by a number of large financial institutions to include bonds and stocks.
- December 1996 Alan Greenspan, Chairman of the Fed, allows bank holding companies to own investment banks and revenue limit increased to 25 per cent.
- August 1997 the Fed indicates that US banks should be allowed to acquire securities firms as the risk posed by underwriting is deemed manageable.
- April 1998 Citicorp and Travellers Group merge to form Citigroup and provide the final blow to Glass-Steagall Act. The Act is repealed on November 12th 1999.

- In 2004 the level of permitted leverage was increased from 12 times capital to 40 times capital, with compliance voluntary (Crotty 2009)

The so-called Big Bang under the Thatcher government in October 1986 made similar provisions for deregulation financial markets in the UK. The deregulation of the industry was what ultimately allowed these firms to grow, to merge and to increase concentration of risk resulting in ‘too-big-to-fail’ institutions (Tregenna 2009, p.610). Haldane (2009) described the moral hazard that this resulted in as there was an implicit expectation that governments would step in to help the financial institutions in the event of a particularly bad event. As a result of this deregulation and the development of large universal banks became so large and complex that risk could not be accurately evaluated either internally or externally (Crotty 2009) and balance sheets became exposed to all of the bubbles and crashes inherent in financial markets and undermined the stability of the banking system (De Grauwe 2008).

2.2.6 Growth of Shadow Banking

The lack of regulation also permitted the growth of what was referred to as ‘shadow banking’, which further contributed to the level of systemic risk. While regulation of the commercial banks was limited, and regulation of investment banks was even lighter, regulation of the shadow banking sector was essentially non-existent (Crotty 2009) Hancock and Zahawi (2011, p.28) described this portion of the banking industry as an ‘invisible network of unregulated or lightly regulated entities where banks hid their riskiest assets from regulators, investors and each other’. The traditional model within banking was known as “maturity transformation”, whereby the institution would hold longer term assets than liabilities which limited risk exposures to short term cash flow problems. The ‘shadow banking’ sector primarily funded long term assets by holding short-term liabilities that could be rapidly sold if required.

Large (2004) warned that the growth of this section of the market could build up risk in unexpected areas, and that those involved may not be fully understand what they are doing. However this market continued to grow and increase in systemic importance. In 2006, only about a quarter of lending originated in the traditional, and more regulated section of the banking industry, down from about 80% twenty years before (Morris 2008). The basic error of this model became apparent in mid-2007 as a number of organisations needed to sell their assets quickly to meet liabilities in an illiquid market. Many institutions quickly found

themselves holding illiquid assets and were unable to meet the demand of panicked customers who were demanding their deposits back (De Grauwe 2008).

2.2.7 Misaligned Incentives

Major flaws in individual remuneration as well as the tacit acknowledgement within the industry that too-big-to-fail institutions would be bailed out by governments created an environment of rampant risk taking in the financial industry (Nyberg 2010, Haldane 2009).

Corsetti, Pesenti and Roubini (1998) noted that the existence of state guarantees, even implicitly, can encourage hazardous behaviour on behalf of these institutions. In 2005, Rajan warned that the changes in managerial incentives within the financial sector were altering the nature of risks that these individuals and organisations were engaging in with potentially drastic consequences. At a Bank of England / FSA sponsored seminar focusing on risk a banker in attendance explained the lack of incentive for individuals or teams to engage in severe stress testing of their organisations. In the event of an extreme shock to the system the employees were very likely to lose their bonuses and probably their jobs. Additionally, if the shock was big enough the government would step in to help the organisation (Haldane, 2009). The attitude of this banker was indicative of the attitudes in the sector. The nature of remuneration was primarily based on annual performance, if employees make profits they earn bonuses but if they make losses they lose their jobs (Financial Times, 2008). As financial organisations grew in size and importance the incentive to manage risk reduced, resulting in 'discipline weakest among those whom society would wish it to be strongest' (Haldane, 2009, p. 12).

Crotty (2009) explains the growth of the mortgages securitisation market, banks and brokers generated new loans that investment bankers packaged into securities which were assessed by rating agencies. Fees were generated at each point of this process and because of this the market expanded dramatically. Total fees of \$2 trillion dollars are thought to have been generated in this market between 2003 and 2008. However, fees earned were not returned in the event of these securities defaulting so there was a massive incentive to keep generating new products, but no incentive to ensure the original mortgages are sound (Crotty 2009, p. 565). Fund managers were assessed against a common benchmark and purchase stocks included in the relevant index. If they believed the stocks are overvalued they would still buy them as even if their individual performance was affected as a result of these stocks, the benchmark will also have performed poorly. There was pressure within individual organisations and from

clients to continually offer similar returns to rival funds. As more traders yielded to this pressure to follow the herd, the deviation from the true value of these assets was prolonged (Rajan 2005). There was no incentive to price the tail risk associated with these transactions because of the expectation that in the event of something bad happening liquidity would be provided by central banks (De Grauwe 2008). Few if any commentators warned against the use of VAR style risk management techniques as this approach to risk management maximised bonuses. 'No one wanted to kill the goose that was laying golden eggs' (Crotty 2009 p. 572).

Haldane (2009 p.27) suggests that 'incentives to generate and propagate risks may have been highest among those (firms) posing the greatest systemic threat'. This was due to the inherent assumption that these too-big-too-fail institutions would be supported by governments in the event of a major crisis. Wages within the industry between 1980 and 2000 were in excess of \$500 billion. Financial advisors frequently advised both the buyer and the seller, creating an obvious, but legal, conflict of interest, particularly considering their own remuneration is directly impacted by the transaction (Friedrichs 2013).

Large financial institutions continued to pay their employees large bonuses in spite of their poor trading results and government bailouts during the recession. In 2006 Goldman Sachs had a bonus pool of \$16 billion, an average of \$650,000 per employee, with some individual traders receiving bonuses as high as \$50 million in 2006. 2007 saw only a reduction of 4.7% of industry bonus payments in spite of disastrous trading results. Goldman Sachs continued to pay out an average of \$500,000 per employee in 2007 and 2008, the peak years of the financial crisis (DiNapoli 2007).

2.2.8 Short Memories

As discussed above there was a collective belief that risk had been managed out of the economy and permanent growth and prosperity were expected in many quarters. Senior politicians and regulators made confident predictions that this was period of 'Great Moderation' and 'the era of boom and bust was over'. Even those who acknowledged there had been an asset boom claimed that the economy could expect a 'soft landing' (Nyberg 2011, p.7). 'The longer the period since an event occurred, the lower the subjective probability attached to it by its agents. And below a certain bound, this subjective probability will effectively be set at zero' (Haldane 2009, p. 6). This situation closely resembled Minsky's (1966) description of a 'euphoric economy', a situation where capital has high and rising prices and due to increased confidence

in the economy organisations undertake projects or make investments where future expected cash flows are used as a source of finance. Similar cycles of large gains and losses had been seen with IT shares in 1999 - 2002. This growth was based on inflated optimism rather than any change in the fundamentals and shows a failure of individuals and of the markets to learn from previous mistakes.

A number of reviews of the financial crisis have highlighted how this misplaced belief was a contributory factor in creating crisis conditions. De Grauwe (2008, p.6) refers to 'a collective madness'. Lord Turner's report notes that the sustained period of growth led to 'a self-reinforcing cycle of falling risk aversion and rising irrational exuberance of the sort to which all liquid traded markets are at times susceptible' (Turner 2009 p.25). The Nyberg report on the failure of Irish banks makes particular note of this issue as a factor stating 'the extent to which large parts of Irish society were willing to let the good times roll on until the very last minute (a feature of financial mania) may have been exceptional' (2011, p. ii). Further reports discuss the marginalisation of risk management within financial institutions in order to maximise returns in a rising market. Haldane (2009, p.11) refers to an arm wrestle between risk managers and fund managers relating to risk and return. When returns are high and continue to be so risk managers lose power to influence decisions. Sorkin (2009, p.122) outlines the example of the Chief Risk Office at Goldman Sachs who was reportedly asked to leave the room at executive committee meetings when issues relating to risk were discussed. Charles Prince of Citigroup said in 2007, just prior to beginning stages of the crisis, 'When the music stops, in terms of liquidity, things will be complicated. But as long as the music is playing, you've got to get up and dance. We're still dancing' (Financial Times 2007).

2.3 Conclusion

Minsky's (1992) financial instability hypothesis argues the financial markets operate in a cycle of three basic types of investments: Firstly, hedge financing units are those which generate sufficient cash flows to pay both principal debt and interest payments due. Secondly, speculative finance units generate income to repay principal debt, but not sufficient to cover interest. Finally, Ponzi units are those that do not generate sufficient funds to repay either principal or interest liabilities. Minsky further argues that a period of stability in financial markets dominated by hedge type investments consumer confidence will grow leading to an

increase in speculative investments and ultimately Ponzi style investments which require asset price inflation in order to be profitable. This theory suggests that financial markets will evolve from a position of stability to one of instability without any exogenous shocks (Minsky 1970, 1992). Minsky recommended greater participation from national governments to ensure that major economic depressions like that seen in the United States in the period 1929 - 1933 are not repeated. Others have also argued that financial markets are not efficient because bubbles and crashes are inherent features of speculative financial markets, and financial markets cannot regulate themselves (Shleiffer 2000, and Shiller 2000). 'This crisis is the latest phase of the evolution of the financial markets under the radical deregulation process that began in the late 1970s' (Crotty 2009, p.563)

Haldane (2010, p. 1) described the banking industry as 'a pollutant', also noting 'systemic risk is a noxious by-product. Banking benefits those producing and consuming financial services - the private benefits for bank employees, depositors, borrowers and investors. But it also risks endangering innocent bystanders within the wider economy - the social costs to the general public from banking crises'. Financial markets are inherently inefficient and bubbles and crashes are an intrinsic feature of financial markets. The industry has proven itself incapable of self-regulation (De Grauwe 2008). Perrow (2007) argued that these catastrophic crisis events were inevitable and the conditions to foster them were sped up by decades of deregulation that allowed banks to grow too-big-to-fail.

The belief that the world had become more stable and interconnected 'allowed greed to trump fear' (Wray 2008, p.i). The impact of the financial crisis has spread far beyond the banking sector and the actual financial losses are almost impossible to assess lying 'anywhere between a large number and an unthinkable large number' (Haldane 2009, p.744). 'It is only in retrospect that we can see the boom for what it was - mass delusion propagated in part by policy makers and those with vested interests who should have known better' (Wray 2007, p. 2).

With a clearer understanding of the causes specific to this financial crisis, and a wider acknowledgement of the increasing frequency and in some people's views the inevitability of these events within financial systems the following sections review the academic literature focused on the areas of Crisis and Crisis Management approaches, Organisational Learning and adaptability and finally the theory from evolutionary biology of the Fitness Landscape which can be used as metaphor for evolution of both individual players within financial systems and the

constant evolution of the system itself. Using these tools it is hoped to assess how this crisis came to be, and management and structural lessons which can be gleaned for future planning.

3 Crisis

3.1 Introduction

There are an increasing number of complex organisations playing critical roles in society, nuclear power plants, air traffic control, telecommunications and the global financial network to name a few (Boin and Smith, 2006, Fischbacher-Smith, 2009). The ability to manage these systems in addition to conceiving and designing them is increasingly important (Weick 1995). Crises are inevitable over the lifecycle of a complex system as it grows and evolves (Grenier 1972). There is no organisation operating in a hazardous environment in any domain that is not vulnerable to crises (Reason et al. 2001). Organisations are frequently balancing their durability with their vulnerability (Dolfsma et al 2011, p. 808). This places an increased onus and responsibility on both institutions and regulatory bodies to balance the potential benefits to be gained from these systems and the risks they pose to wider society.

Complex systems are difficult to understand, there are a variety of different relationships and interactions between internal parts of the system and with external agents and the surrounding environment. Some of these interactions are essentially invisible or happen under contracted periods of time making them extremely difficult to perceive (Hmelo et al. 2000). By their nature complex systems cannot be designed or constructed in a way that predicts all possible outcomes and staff cannot be trained to respond to all possible eventualities that may occur in a tightly coupled system. They are ‘composed of interacting ‘agents’ following rules, exchanging influence with their local and global environments and altering the very environment they are responding to by virtue of their simple actions’ (Sherman and Schultz 1998, p. 17). Nonlinearity, instability and the resulting uncertainty are essential components in the evolution and growth of complex systems (Gleick 1998). Bea (1998B) in assessing major events on offshore structures notes that more than 80% of accidents occur during operation and maintenance rather than caused by engineering errors within the structures themselves. System design, contingency planning, back-up systems, safety training and operator intervention can limit the frequency and severity of these events (Perrow 1981). This is evidenced by recent global events in the financial sector which have emphasised the interconnected level of organisations and industries and how quickly crises can spread between them (Haldane 2010, Tett, 2010).

The level of interconnection within the financial industry meant that the effects of the Financial Crisis quickly spread across the globe. Haldane (2010) has compared the financial system to a biological ecosystem, where the actions of one organism impacts and changes both organisms, and the system as a whole. Similarly, previous work in the area of agglomeration discusses how organisations in the same industry co-evolve as ideas and personal, ideas and technological advances interact within the same gene pool (Ellison and Glaeser 1997, Kaufman 1995). Innovation within the financial industry saw rapid growth in volume and value of complex securitised products (Tett 2010). During the initial period of the crisis the complex nature of these products meant that institutions were uncertain of their level of exposure to these events, and had no idea of the exposure of their counterparties. Organisations began hoarding whatever liquid reserves they had and central banks were forced to pour cash into the economy in order to avoid the collapse of many of these banks. For a period of time after the collapse of Lehmann Brothers in September 2008 the inter-bank lending market effectively ground to a halt. The financial system had effectively had a heart attack. (Wray 2008, Haldane 2009, 2010). This was a systemic and nested crisis as the impacts could be seen and experienced at a variety of levels: the individual organisation; at industry level; internationally; at central bank level; and the knock on effects could be seen in the wider economy as a deep recession took hold.

3.2 What is a crisis?

The nature and impact of individual crises can vary widely depending on the industry or specific circumstances involved. Many varied events have been used as examples of crises in the literature, the gas leak at the Union Carbide plant in Bhopal (Mitroff and Pauchant 1990), the Exxon Valdez oil spill (Shrivastava 1990), the crash of the Challenger shuttle (Vaughan, 1996, 1997), the Kegworth Air Disaster (Smith 1992), the financial crisis (Wray 2008, Haldane 2010). Others have discussed crisis in relation to terrorist attacks (Fischbacher-Smith 2005, Coleman and Wu 2006) and many have focused on natural disasters like hurricanes (Bea et al. 2009). Van Wart and Kapucu (2011) differentiate between public and private sector uses of the word crisis. In the private sector the term crisis generally refers to all untoward events, sometimes irrespective of severity. Whereas in the public sector untoward events which are predictable are generally classed as emergency situations, whereas a crisis suggests that the system has been completely overwhelmed and the demands created exceed the available resources.

This uncertainty has led to a number of writers suggesting typologies of crises rather than definitions. Smith (1995) noted five broad areas where previous crisis literature focused: turnaround management; organisationally based disasters and catastrophes (technological failures); environmental crises; ethics and corporate crime; and corporate collapse. James and Perry (1993) differentiate between 'sudden crises' and 'smouldering crises'. T'Hart et al. (2003) similarly discuss 'creeping crises'. Koover-Misra et al. (2001) identify three different types of crisis: Technological Disasters which occur in organizations that use complex technologies as part of their operations; Crises of Decline which occur in profit seeking organizations that experience decline generally caused by internal issues that limit their ability to respond to industry changes; Developmental Crises occur at transition points during the growth and evolution of an organization. Gladstein and Reilly (1985) differentiate between a threat, a negative event with less intensity than a crisis, and crisis. Shrivastava and Mitroff (1989) however identified two distinct type of crisis: Technical / Economic which includes major industrial accidents and system breakdowns; and Human / Organisational / Social which covers organizational breakdown, failure to adapt to change and sabotage. Pearson and Mitroff (1991) add an additional layer to this by differentiating between 'severe' and 'normal' crises. A further attempt to codify crisis events is offered by Gundel (2005) who suggests two classification criteria of crises: 'level of predictability' and 'ability to influence'. Events that are easily predictable and influenced are deemed 'conventional crises'. A predictable crisis is one where the time or manner of occurrence are knowable to a third party. A crisis can be influenced whereby a response that can reduce the potential damage of an event is knowable and can be executed. Crises that are difficult to predict but easily to influence are described as unexpected crises. Alternatively events that are easily predictable but difficult to influence are intractable crises. Finally those events that are both unpredictable and difficult to influence are fundamental crises.

There remains no widely accepted definition of a crisis although many suggestions have been offered. Dyson (1983. P. 28) acknowledges this difficulty noting that 'crisis is a perceptual affair a particular crisis is likely to consist of a set of nested crises. Many definitions focus on threats to organisational structure or survival (James and Wooton, 2005), some focus on the implications to the financial health or profitability of the organisation (Shrivastava and Mitroff, 1987); and some discuss the need for swift decision making under uncertain conditions (Rosenthal et al, 1992,). Smart and Vertinsky (1984) and Weick (1988) refer to crises as low probability events, while Grenier (1972) and Turner (1981) discuss the inevitability of crisis

events over an organisation's life cycle. Hermann (1972) outlined three conditions required for a situation to be considered a crisis: a) a surprise to decision makers, b) a threat to high priority goals, and c) a restricted amount of time available for response. Koovar-Misra et al (2001) note that these competing attributes used to describe crises can cause confusion as much as offering clarity to this discussion.

Shrivastava et al (1988, p. 285) offer a broad definition of crises as 'organisationally based disasters which cause extensive damage, social disruption and involve multiple stakeholders and unfold through complex technological and social processes'. Bea (1998, p.3) defines a crisis as 'a rapidly developing sequence of events in which the risk associated with the system rapidly increase to a hazardous state'. Pearson and Clair (1999, p. 66) offer a definition that attempts to combine the views from psychological, social-political and technological perspectives: 'An organisational crisis is a low-probability, high-impact situation that is perceived by critical stakeholders to threaten the viability of the organisation and that is subjectively experienced by these individuals as personally and socially threatening. Ambiguity of cause, effect, and means of resolution of the organisational crisis will lead to disillusionment or loss of psychic and shared meaning, as well as to the shattering of commonly held beliefs and values and individual's basic assumptions. During the crisis, decision making is pressed by perceived time constraints and coloured by cognitive limitations.

Smith (2005, p.3) suggests a definition of crisis which describes 'a damaging event, or series of events, that display emergent properties which exceed, or comes close to exceeding an organisation's abilities to cope with the task demands that it generates and has implications that can affect a considerable proportion of the organisation as well as other bodies. The damage that can be caused can be physical, financial, or reputational in its scope.' This definition resonates with the examples utilised in this research, as it highlights the need for the organisation to recognise and quickly respond to different task demands in a chaotic period of great uncertainty.

3.3 Crisis Literature

Much of the research previously conducted in the area of crisis is focused on the nature of crisis events, how they develop, how they manifest themselves and how individuals and organisations can respond to them. Many major crises, disasters or company failures have initially been blamed on the errors or failures of front line individuals. However, subsequent investigations

frequently show systematic organisational errors as major contributory factors to these events (Smith 1992, Vaughan 1996). Exclusive focus on the trigger event and ignoring much of the background detail can limit the ability of organisations to learn from mistakes made their own organisation or others in their industry (Smith 1992). In many instances it is impossible to highlight individual causes of a crisis as there are often a multitude of factors whose complex interactions trigger unexpected consequences (Mitroff and Pauchant 1990).

Shrivastava and Mitroff (1989) describe three stages of an unfolding crisis. Initially there are a number of small incidents or warnings indicating potential problems within the system. The second stage is the crisis itself. The final point is the evolution of the crisis as internal and external pressures mount and events spiral out of control of management. Bea and Roberts (2001) discuss crisis events as consisting of an initiating event, wider contributing issues and compounding events. A slightly different view suggested by Smith (1990, 1992) is the Model of Crisis Management. This model outlines three stages of crisis: The crisis of management, the operational crisis and the post-crisis legitimisation. Taking this view as a starting point it allows the literature to be separated into three categories. First, the literature that focuses on the causes and generation of crisis events. Second, the literature focused on the crisis itself and immediate management reaction. Finally, the period of post-crisis evaluation focuses on how organisations learn from and respond to the crisis event.

In contrast, many economists who discuss fluctuations in financial markets do not refer to these events as crises, but as natural by-products of an unstable system (Minsky 1964, Rajan 2005, Wray 2008, Kelly 2010). Minsky (1986, p. 333) described how a period stability in financial markets will ultimately breed instability, that the 'basic dis-equilibrating tendencies of capitalist finance will again push the financial system to the brink of fragility... there is no possibility that we can ever set things right once and for all; instability, put to rest by one set of reforms will, after time, emerge in a new guise'.

3.3.1 Crisis of Management

The crisis of management phase is where initiating and contributory events first develop (Bea 2001). A crisis could still be averted at this point but in complex tightly coupled systems these weak signals may be missed or their importance may not be recognised, they can be allowed to incubate within the system (Turner 1977, 1979). Early warnings and weak signals are often highlighted either externally or by junior members of staff and are not believed or acted upon by management as the sources were deemed not to have legitimate expertise in the area

(Turner 1978). Investigations into the Challenger shuttle explosion outline the dangers that can arise when early warning signals are misinterpreted or missed completely. Damage to the O-rings was noted in earlier flights but had not had any impact on performance so engineers began to accept a small degree of damage as acceptable (Vaughan, 1996). This incident also outlines how a variety of signals prior to a crisis can be missed or ignored but in subsequent investigations show how many opportunities there were to stop the incident from happening. Hindsight has frequently shown contributory events have been missed or ignored by senior management. A study of 84 bridge collapses conducted in 1980 found that none of these failures were caused by technical issues unknown to structural engineers. They were variously attributable to errors of management, design, construction, maintenance or use (Turner 1994).

When these early warnings or weak signals within the system are not recognised they will remain dormant in the background awaiting a trigger. This concept, known as 'incubation' stems from Turner's work *Man Made Disasters* (1978) where he outlines his theory that management's ingrained beliefs limits their willingness to look outside their decision making processes. The potential for failure can be embedded within an organisation but remain unnoticed until triggered by an emergent event. Reason (1990) also argues that the potential for failure is latent within all organisations; describing 'resident pathogens' that develop unnoticed in the background. A 'failure of foresight' allows these events to develop unnoticed or unacknowledged. In the case of the Challenger shuttle launch, the nature of the work carried out by NASA created an environment where problems were expected and often taken for granted. The early warning signals recognised, but as they became routine so too did the response and the perception of risk and the potential for disaster was allowed to develop (Vaughan, 1996).

Garciano and Posner (2005) discuss how the organisational structure can limit people's willingness to contradict the decision made by supervisors for fear of limiting potential promotional opportunities. The Challenger case again provides an example of this. NASA was under increased financial pressure in the years prior to the Challenger launch leading to a gradual shift in management priority toward production in place of safety. As shuttle missions continued between 1977 and 1985 Marshall and Thiokol Engineers 'gradually expanded the boundaries of acceptable risk' (Vaughan, 1996, p. 85). This began an incremental descent of safety standards, ultimately resulting in the Challenger disaster.

‘Anomalies were found on many missions prior to Challenger Marshall and Thiokol engineers responsible for initiating risk assessment of the boosters continually normalized the technical deviationThe crucial decision was the first one, when expecting no damage to the O-rings, in flight damage occurred and they found it acceptable (Vaughan 1996, p. 85).

These unexpected events expose the gaps in organisational defences that were highlighted by Reason (1996, 2000) with what he referred to as the ‘Swiss Cheese’ model. Complex systems have many defensive layers and there are always weaknesses within these systems. He compares the gaps in these defences to holes in a slice of Swiss cheese; however these gaps are constantly opening, closing and moving and are rarely considered problematic. If these defensive gaps align they create a ‘vulnerable pathway’ (Smith 2005, p.1) for a complex situation to develop as the initial failure moves through the system’s multiple layers of defence. The terrorists responsible for the 9/11 attacks in America were able to exploit numerous gaps in security in order to achieve their aims. They were aware of the relaxed security within airports for internal flights, they were aware that flight crews were trained not to resist in hostage situations and their attacks were aimed to occur in a very short space of time to limit the ability of the military to respond (Fischbacher-Smith et al. 2009, Michel-Kerjan, 2003).

The role of decision making in crisis generation has also been the subject of a number of studies. A wider degree of expertise is often required when making more complex decisions than can be provided by any one individual. Organisations circumvent the problem of bounded rationality by compiling this expertise to allow for wider gathering of information in order to arrive at more informed and efficient decisions (Garciano and Posner 2005). However, on occasion this approach can lead to a situation of groupthink; the teleconference prior to the launch of the Challenger shuttle is a well-documented case of this where the silence of some individuals was taken as agreement of the decision to launch (Fisher and Kingma, 2001).The concept of ‘groupthink centres on how particular decision making settings and practices detrimentally affect the group making decision process and produce poor outcomes’ (Schafer and Crichlow 2002, p. 2). Janis (1972) attributed errors surrounding the events of the Bay of Pigs in 1962 to groupthink and explained how in the interests of achieving a consensus, individuals can be unwilling to put forward conflicting ideas to the group. It has been suggested that errors of groupthink are more prevalent in situations where there is high cohesiveness amongst the decision making team (Sasou and Reason, 1998) or within groups who have previously achieved success through group decision making (Sundaramurthy and Lewis 2003). Taleb et al. (2009)

noted that the long period of growth and success in the financial markets prior to the Financial Crisis in 2007 contributed to the accumulation of large exposures to low-probability events.

3.3.2 Operational Crisis

The operational phase is concerned acute stage of the crisis, when an evolving situation creates task demands exceed the abilities of the organisations (Lane 2012, Smith 2005). Perrow (1984) describes how a situation can rapidly develop into a crisis as a result of the tight coupling and interactive complexity within the system. This allows the emergent issues to cascade through vulnerable pathways or gaps in defence (Reason 1990) and rapidly escalate beyond the ability of the organisation to control events. In the case of 9/11 many gaps in defences were highlighted in hindsight, there were many opportunities to have arrested some or all of the individuals involved prior to the day of the attacks. However, on the morning of the attacks the attackers passed through security and managed to bring make-shift weapons on board, take advantage of airline policies in relation to hijackings and timed their attacks to minimise the possible response time. The defensive gaps at many points in the system were individually bypassed and events escalated rapidly beyond the ability of the individual airlines and of the FAA to quickly respond (Smith 2005).

As an organisation becomes more complex information and decision are filtered through an increasing number of individual, groups, and often locations. Dolfsma et al. (2011) discuss how a common language develops within institutions and even within individual silos of an organisation. As these boundaries form communication between these groups can become more prone to misunderstanding and error. The interaction between these various elements can lead to the emergence of previously unpredicted properties in the system (Perrow 1981). As an organisation moves from a complex situation toward a crisis there are various points of inflection in this process where decision makers can react to either contain or exacerbate the event (Smit 2005). At a certain tipping point (Gladwell 2000) these issues crystallise and the organisation is moved from a phase of stability to one of chaos (Kauffman 1993). When the situation evolves beyond the limits of existing contingency planning management are required to respond to the event rather than their pre-existing ideas (Smith 2005). Rigid management structures may inhibit the ability of the organisation to respond and allow the emergence of further task demands and exacerbate the consequences of the crisis (Fischbacher-Smith and Fischbacher-Smith 2009). In the case of the Challenger Shuttle Crash the complex decision

making structure, the launch decision made during a teleconference between staff and engineers from three companies based in three different cities, contributed to the generation of failure potential (Kingma and Fisher 2001).

Black Swan events (Taleb et al. 2009) show that it is impossible to predict the whole range of crisis events, however 'it is never the less important to ensure that the organisation is flexible enough to respond to uncertain events' (Smith 1992). Mitroff and Pauchant (1990) differentiate between two types of organisations; the crisis prone organisation, which are an accident waiting to happen, and the crisis prepared organisation, which make every effort to prevent a crisis from occurring and also made provisions to manage those that do. Organisational crisis management is aimed at averting crises from happening in the first place, or at managing crises that do occur (Pearson and Clair 1999). Crisis readiness is defined as 'an organisation's ability to effectively respond to and recover from external events (such as terrorist attacks and natural disasters), as well as internal events (such as major accidents and financial/funding crises) (Light 2008).

Early perception of a crisis event is of vital importance. The earlier a crisis can be recognised the greater the chance there is to bring the situation under control. This requires constant vigilance and attention to maintain a mental picture of the system as a whole and to detect anomalies at any stage of the system (Bea 1998A). Attempts to diagnose a crisis are often made under conditions of ambiguity and insufficient information. Managers are likely to focus on potential crises based on the organisation's and their own previous experience, but this focus can lead to new types of crisis being ignored or missed (Koover-Misra 2002). Failure to reassess a situation based on emerging information, over confidence in ability to control a system, over estimation of ability to control events and a focus on stronger signals while ignoring more relevant weaker signals have also been identified as factors that can prevent perception of a crisis (Bea 1998A).

Cooks and Woods (1994) identify three classes of cognitive factors that govern the actions of organisations operating at 'sharp end' of complex settings:

- Knowledge factors - background knowledge that can be drawn upon when problem solving
- Attention dynamics - ability to manage the mental workload of evolving situations and to divert attention accordingly

- Strategic factors - prioritising conflicting goals when decisions are made under uncertainty and with limited resources.

The primary focus in a crisis is to maintain the vital functions of the organisation. The importance of staff experience is vital here as they have a better understanding of the important resources to focus on and shortcuts that can be utilised (Bea, 1998A). Sensemaking as discussed by Weick (1995) similarly focuses on the ability of an organisation to convert a problematic situation into a problem that can be responded to. In the case of United Airlines Flight 232 from Denver to Chicago in 1989 the pilots lost hydraulic power in a manner that was previously not thought possible. The captain's response to the situation included group discussion between the crew, flight controllers and engineers on the ground, and acceptance of assistance from a passenger who was a training pilot. This approach allowed for the situation to be understood, an accurate picture of the problem was developed, and possible solutions were generated. While 111 people died in the incident, 185 people on board survived in an incident that was widely hailed as a miracle within the industry (Roberts and Bea 2001).

Management during the operational phase of the crisis is not aimed at long term solutions, the primary goal during a crisis event is to help the organisation cope with and survive the extreme event (Boin and t'Hart 2003). Alternatively Lalonde (2004) stated that survival and recovery from a crisis event was not enough to deem the managerial response successful, management should be expected to achieve organisational goals during the event. Van Wart and Kapucu (2011) attempted to discern the managerial traits that are required during the response phase of a crisis event. The most frequently noted traits that were highlighted were: willingness to assume responsibility; flexibility; decisiveness; and communication. They further suggest that the leadership traits required in the response phase of a crisis differ considerably to those traits that are needed in the rebuilding phase after the event. Light (2008) similarly noted that the type of leadership needed in the midst of a battle is different to that required in both the planning and debrief of the battle. It has also been argued that crisis events can be opportunities for certain organisations who have the capabilities to adapt to a changing landscape (Taleb 2012, Van Wart and Kapucu 2011).

The importance of communication in crisis situations has also been highlighted, Townsend and Moss (2005) noted that better communication in the aftermath of the tsunami in South East Asia could potentially have saved thousands of lives. Coleman and Wu (2006) note the importance of calm and professional communication, both verbal and non-verbal, in the midst

of a crisis event. Gladstein and Reilly (1985) found senior managers will make decisions under threatening conditions with less information and fewer channels of communication than in normal conditions. They further suggest that sharing of information may aid group maintenance rather than decision making, as under stressful conditions specialisation increases and decision making is streamlined.

3.3.3 Crisis of Legitimation

The legitimisation phase is the process of turnaround and organisational learning following the actual crisis event itself. Smith (1995) notes three phases of turnaround. Initially the organisation is focused on defending the organisation from reoccurrence or further impact of the crisis itself. The next focus is on consolidation and regaining stability in the organisation. Finally the organisation must respond to the events and attempt to rebuild. The aftermath of a crisis includes the eventual collective adaptation and replacement of old practices and relationships' (Pearson and Clair 1999, p.64). Toft (1992) described types of learning following crisis events: Organisation specific learning by those who directly experienced the crisis; isomorphic learning where general lessons are drawn from the events; and iconic learning which refers to individuals and organisations who learn about the crisis through various media outlets. In many instances organisations fail to acknowledge any more root causes of the events and attempt to 'explain away' a crisis event. Union Carbide blamed sabotage for the Bhopal disaster and Exxon blamed errors made by the captain for the Exxon Valdez oil spillage (Mitroff and Pauchant, 1990).

No matter how good an organisation's risk management planning is, it is impossible to prevent all crises (van Wart and Kapucu 2011). A concerted effort on behalf of management to improve communication with and between staff, accept information and criticism from external sources, and to acknowledge the potential impact of the actions of the organisation and the industry as a whole, will contribute to a reduction in the frequency, severity and consequences of these major events (Turner 1994). The financial industry is still recovering from the impact of the financial crisis. A number of large international financial institutions had no contingency for plan to respond to an event of this magnitude. Some of these organisations did not survive while many required bailouts from their central banks or governments. Similar incidents have been seen in this industry in 1987, 1991, 1997 in what were said to be once in a lifetime

unpredictable events. There has been a failure to learn that these events cannot be predicted (Taleb et al. 2009).

Managers should systematically study previous crises experienced in other organisation in order to highlight any internal weaknesses and limit the chances of similar experience (Mitroff and Pauchant 1990). Many companies show reluctance to acknowledge their own potential weaknesses and exposures to similar events (Smith 1999). Lord Justice Taylor stated in his report following an inquest into the Hillsborough disaster that all those responsible for certifying, using and supervising sports grounds should take a hard look at their arrangements and keep doing so. Complacency is the enemy of safety' (1990: p.5). However, simply acknowledging risks and potential pitfalls of crisis management may not be enough. The Centre for Disease Control in the US has been working since 1999 to improve the nation's epidemiology and laboratory systems to counter any bioterrorist attack or pandemic. They cannot know the exact location or nature of any future outbreak but their preparation aspires to be flexible enough to respond whatever need arises (Khan et al. 2000).

Organisational crisis management effectiveness is evidenced when potential crises are averted or when key stakeholders believe that the success outcomes of short and long -range impacts of crises outweigh the failure outcomes' (Pearson and Clair 1999, p. 61). Having a crisis plan in place does not guarantee an organisation can survive a crisis event, rather than merely responding to changing events a proactive posture is required (Nudell and Antokol 1988). Crisis readiness is the desired end state of organisational preparedness, crisis management, business continuity planning and other organisational activities and processes (Light 2007). Reilly (1987) identified six components of crisis readiness: 1) ability to respond quickly to a crisis; 2) manager's awareness of organisation's crisis management plans; 3) manager's access to crisis management plan; 4) adequacy of the firm's strategic planning; 5) organisation's media management ability under crisis conditions; 6) the perceived likelihood of a crisis event in the organisation. (Reilly 1987).

As outlined above many people have tried to provide a comprehensive theory of crisis. The range of industries researched, the comparison between private industry and government events and the volume of case studies used demonstrate the breadth of events which can be termed crises. Each individual event discussed in the literature is so specific and idiosyncratic that in reality there is no and possibly cannot be a single theory or definition of crisis. There are traits and similarities that can be recognised across these events but in most cases it is the

crisis event which is recognised and not the contributing factors. They are identified in the aftermath and often used as teaching moments to avoid a reoccurrence of a similar event. Learning from these events and adapting to changed conditions in the aftermath are often the key takeaways from crisis events.

4 Organisational Learning

4.1 Learning from Crisis

Organisational learning can often occur in the aftermath of a crisis as crises allow for challenges to be made to the core assumptions and beliefs that underpin control strategies for organisational processes (Smith and Elliott 2006). Turner (1976) referred to this as 'cultural readjustment' which was the changes to operating practices deemed assumptions and beliefs changed in the aftermath of a crisis. Turner's (1976, 1978) research contains an implicit belief that organisations learn from crises but subsequent research has shown that is not always the case (Elliott and Smith 1993, 1997). 'Change under crisis and revolution is exhausting to an organisation' (Argyris 1977, pg 3) and a focus of much research in this area is now aimed at allowing organisations to continuously learn and evolve in order to remain competitive and avoid the emergence of crises. The benefit of learning is that it can help to reduce vulnerability within organisations and a failure to learn can result in organisations continuing to incubate vulnerable pathways that can lead to the emergence of a crisis (Smith 1995).

4.1.1 What Is Learning?

Various definitions of organisational learning have been offered by researchers in this area. Argyris (1977 pg 2) describes organisational learning as 'a process of detection and correction of errors'. Cohen and Levinthal (1990) believe the objective of organisational learning is 'to increase the ability of searching, encoding, distributing, and interpreting the external information, which is called the 'absorptive capacity' of the organization'. According to MacIntosh and Maclean (1999 p. 10) 'Learning means reacting to the same stimulus in new ways'. Simpson et al (2000 p. 1) offer a simple goal of learning which is the aim 'to come to know what is not known'. Kolb et al's (2000 p. 2) view is that 'all learning is *relearning*best facilitated by a process that draws out the beliefs and ideas about a topic so that they can be examined, tested, and integrated with new, more refined ideas'.

Tsang (1997) differentiates between organisational learning and the learning organisation. 'Organisational Learning' is a descriptive action that examines how an organisation actually learns and is focused on outcomes and achievements. The 'Learning Organisation' examines

how an organisation *should* learn and is focused on process and purpose. Pedler et al. (1989, pg 1) define the learning organisation as one 'which facilitates the learning of all of its members and continuously transforms itself to meet its strategic goals'. There has been a debate as to whether organisational learning was simply the sum of what individuals learn within organisations, or if more is involved (Easterby-Smith et al. 2000). Simon (1991) does not believe that human characteristics, like learning and thought, can be attributed to an inanimate object like an organisation. Garratt (1987) argued that in any organisation there are only a small number of people who realistically have an input into strategic decisions and that an assessment of these individual's abilities and processes would give a strong approximation of the organisation's behaviour. In contrast, Shrivastava (1983) believed that learning could be stored in an organisation's structures and processes. Davies and Nutley (2007) believed that while learning was conducted by individuals and organisation is not simply a sum of the individuals, the whole was more than the sum of the parts and organisations can accumulate competence and individual learning can be retained despite the turnover of staff.

The traditional view is that learning takes place within the heads of individuals or in organisational systems and structures (Easterby-Smith et al. 2000). This has been challenged by the theory that learning occurs and knowledge is created, generally through a combination of cognitive and social activity (Gherardi, Nicolini and Odella 1998). The following section will outline a number of approaches to organisational learning that have been referred to in the literature. A number of barriers to learning have also been identified in this area of research and these issues are discussed below.

4.2 Types of Organisational Learning

Easterby-Smith et al. (1998) differentiate between practitioner views of organisational learning, which are primarily focused on creating learning organisations and the academic approaches which aim to study the learning processes within organisations. Argyris and Schon (1978), March (1991) and Huber (1991) approach organisational learning from an individual perspective, taking ideas from psychology regarding how an individual processes, interprets and understands information, and using these ideas to develop models for collective learning within an organisation. Cook and Yanow (1993) question this approach believing there is no clear link between individual learning and collective learning.

Reorientation occurs when modest adjustments are no longer sufficient to keep pace with environmental changes and major strategic changes are deemed necessary for future success (Tushman and Romanelli 1984). The deep structures and rules that defined the previous business model must be identified (MacIntosh and Maclean 1999). When these defensive routines are surfaced, the ones no longer appropriate can be discarded allowing new rules and behaviours to be explored in order to create the new desired structure (Macbeth 2002). Following that the company needs to enter a non-equilibrium state in order to allow the new structures to take hold. 'At this point the system becomes open to its environment, importing energy and exporting entropy as a new structure takes shape in accordance with the operations of a set of simple order-generating rules' (MacIntosh and Maclean 1999, pg 5). During the chaotic period of disequilibrium, known as the bifurcation zone, 'traces of the old organisation will inevitably remain and there will be pressure to revert to tried and tested methods' (MacIntosh and Maclean 2001, pg 5). If the defensive routines are too strong an attempt will be made to make the old methods work better, this may lead to an improved short term performance (Macbeth 2002). This reversion has been referred to as switching or schizoid behaviour (Greenwood and Hinings 1988). Feedback must be managed and encouragement offered to any positive responses or achievements of the new approach to re-enforce the new rules and deep structures (MacIntosh and Maclean 2001). March (1981) observed that companies who delay too long in making these adjustments are often forced into riskier strategic changes and the attempts to save the business can ultimately speed up the process of decline.

Relative Inertia, as described by Hanna and Freeman (1984) describes how the rate of strategic change that an organisation can implement over time will be less than the rate of change in their environment. Organisations can be slow to change their strategy, in spite of developments in the wider environment, as it has developed from the experience and learning of senior management (Burgelman, 1991). Burgelman explains this phenomenon through the example of Intel's delay in moving their focus from developing memory products to micro processing. A number of senior managers were slow to accept the need for to develop into a new market, believing that better versions of their existing products would be sufficient to maintain growth. Adjustments are focused on peripheral features of an organisations operation and leave the overall company strategy in place (Snow and Hambrick 1980). Adjustments can lead to a temporary improvement in performance but it is expected that environmental shifts will ultimately outpace these adjustments and strategic change will be necessary for the survival of the organisation (Burgelman 1991).

Kolb (1984, 2000) described the idea of experiential learning, which is ‘a process of constructing knowledge that involves a creative tension among the four learning modes that is responsive to contextual demands. This process is portrayed as an ‘idealized learning cycle or spiral where the learner “touches all the bases” – experiencing, reflecting, thinking, and acting – in a recursive process that is responsive to the learning situation and what is being learned’ (Kolb 2000, pg 2). Kolb’s Learning Cycle asserts four elements to organisational learning: ‘Concrete Experience; Observation and Reflection; Forming Abstract Concepts; Testing in New Situations’ (Kolb, 1984). This theory suggests that ‘all learning is *relearning* best facilitated by a process that draws out the beliefs and ideas about a topic so that they can be examined, tested, and integrated with new, more refined ideas’ (Kolb 2000, pg 2). This approach advocates a similar cyclical learning style to Argyris’ Double Loop Learning theory. Kolb’s theory emphasises learning from experience while ‘double loop learning believes’ that ‘organisational learning is a process of detecting and correcting errors (Argyris 1977, pg 2). Many companies can have difficulty adapting to this as they are not aware the problem even exists as the very way they define and solve problems can often be a core issue (Argyris 1991). The prime error made within single loop learning is an unwillingness to identify and learn from all possible causes of problems. ‘Most people define learning as mere ‘problem solving’, so they focus on identifying and correcting errors in the external environment’ (Argyris 1991, pg 1). Whereas companies who acknowledge all internal and external causes ‘the end result should be increased effectiveness in decision making or policy making....and in the probabilities that errors and failures would be communicated and the actors would learn from the feedback’ (Argyris 1976, pg 8).

Central to organisational survival and continued growth is the ability to exploit current capabilities and the same time as exploring new opportunities (March 1991). Duncan (1976) coined the phrase organisational ambidexterity when he described this paradoxical strategic challenge faced by most organisations but March’s (1991) research is held up as the basis of subsequent interest in the area. These two approaches may require two distinct organisational structures and strategies but March contends that a correct balance of these two approaches can greatly improve long term prospects of a business. Raisch and Birkenshaw (2008, p. 1) define organisational ambidexterity as ‘an organisation’s ability to be aligned and efficient in its management of today’s business demands while simultaneously being adaptive to changes in the environment’. Tushman and O’Reilly (1996) believe ambidexterity requires the ability to

operate complex organisational designs in a manner which provides both short-term efficiency and facilitates long-term innovation.

March (1991) discusses two different organisational learning structures, exploitation and exploration, that can be the focus of resources and attention. Initially differentiation between exploitation and exploration was focused on the type of learning, not merely the absence of learning. Exploration involved a concerted effort to gain new information and experience but exploitation of current resources and abilities still involved learning and refinement (Raisch and Birkenshaw 2009). Some researchers (Vassolo, Anand and Folta 2004), categorised any element of learning as exploration. March (1991) expressed concerns about whether these two approaches could be compatible within an organisation although subsequent research has suggested that organisations can successfully achieve this balance.

Tushman et al. (2006, pg 1) found 'that ambidextrous organisation designs are significantly more effective in executing innovation streams than functional, cross functional and spin out designs'. Chirico and Salvato (2008) state that knowledge is the organisational asset most likely to lead to enduring success but that dynamic capabilities rely heavily on the firm's ability to integrate new and existing knowledge within the organisation. Achieving the balance of these approaches is important as a predominant focus on exploitation of current skills and resources will certainly help with short term performance but over time an organisation may be left behind as the environment evolves (Ahuja and Lampert 2001). Alternatively an over emphasis on exploration can result in too much time and energy wasted on projects and products that do not develop or deliver (Volbredda and Lewin 2003). Long term success and survival is dependent on the ability of an organisation to exploit current resources for short term success and also to engage in exploration to ensure long term viability (Levinthal and March 2003). The importance of balancing exploitative and explorative organisational learning for long term success has been echoed by van Jansen, van den Bosch and Volberda (2005) and Feldman and Pentland (2003)

A key feature of organisational ambidexterity is a firm's ability to host innovation streams at the same time as focusing on current environmental requirements. However, the organisational structure required to deal with these competing factors can be difficult to achieve successfully (Tushman et al. 2006). The process of managing this balance has been subject of a number of studies. A model of organisational evolution, developed by Tushman and Romanelli (1985), is defined by long periods of stability punctuated by short periods of change. Tushman and O'Reilly (1996) discuss the importance of the combination of factors and recommend a focus

on exploitation during times of strategic change, and a focus on exploration and transformation in times of steady progression. Chirico and Salvato (2008) in their research on learning within family businesses note that firms with a proven ability to adapt within dynamic markets are characterised by high levels of internal social capital; have an affective commitment to change; and low levels of relationship conflicts. It has further been suggested that organisational inertia can be developed as incumbent senior managers will continue to focus on current technologies and customer bases. As a result of this specific departments or collaborations are required to develop new products and markets for the organisations (Campbell and Park 2005).

Mom, van den Bosch and Volbreda (2007) found that managers who engage in top-down information flows are focused on exploitation and managers who utilize horizontal and bottom up knowledge flows benefited from exploration. A combination of these approaches within organisations allows for higher levels of exploration and exploitation. Tushman et al. (2006, pg 4) similarly find 'ambidextrous organisational designs are composed of an interrelated set of competencies, cultures, incentives and senior team roles'. Their research shows that effective use of this structure leads to improved product innovation at the same time as achieving improved ongoing performance of existing products. Raisch and Birkenshaw's (2008, pg 6) summation of the requirements for successful organisational ambidexterity outlines the need for a firm to 'simultaneously pursue double loop and single loop learning, incremental and radical innovation, stability and transformation in organisational adaption, induced and autonomous strategic processes and efficiency and flexibility in organisational design.

Additionally, a crisis event may provide the stimulus to generate cultural shifts within organizations in several ways. First, a crisis demonstrates that 'apparently insignificant' problems can interact together to generate significant ones..... Second, crises often highlight the limitations of prevailing norms, beliefs and practices..... Third, a crisis event will be of such significance that it will attract the attention of external stakeholders (media, government, regulators and 'publics') which may lead to an examination of its causes and effects with the objective of identifying the lessons to learn from such an event (Elliott and Smith 2006, pg 294). The recent financial crisis, which manifested itself in the form of a major loss of liquidity throughout the industry, exposed a lack of preparedness combined with an attitude of 'it won't happen to us'. The industry has been publicly chastised for its lack of preparedness and its focus on profits ahead of risk (Haldane 2009; Jorion 2009; FSA 08/23).

Long term benefit can only be gained if individuals and companies have the willingness to 'ask critical questions of others and themselves if they are to be effective in fully reaping the potential benefits' (Tsoukas 1991, p. 15). Revens (1969, p. 283) outlined an approach he called 'action learning' that 'seeks the means of improvement from within' an organisation, believing that 'the daily round offers constant learning opportunities' but 'the quality of such learning is largely determined by the morale of the organisation'. Pedler et al. (1989) believe that Revens' approach complements that of Argyris (1977) as they offer a similar theory but with contrasting approaches. Argyris is described as the 'Brain Surgeon' of organisational change and Revens the 'Doctor of the Soul'.

4.3 Barriers to Organisational Learning

As outlined above, a number of researchers advocate ongoing organisational learning as a necessary component of the long term strategy for successful organisations (Peters and Waterman 1982; Pedler et al. 1989). Prior to this Turner (1976, 1978) discussed organisational learning in the context of crisis events, implicitly assuming that organisations can learn and adapt to new norms in the wake of high impact events. More recent research has shown that this is not always the case (Elliot and Smith 2006). A major benefit of engaging in organisational learning is limitation of 'defensive routines' within organisations. Organisations who continue to react to stimuli in the same way allow these defensive routines to develop (MacIntosh and Maclean 1999). The internal politics and attitudes of individuals in senior positions are very important in attempts to create a learning organisation (Easterby-Smith et al. 1998). Group defensive routines can develop whereby 'there would be relatively little genuine feedback and others would tend not to violate their governing value and so disturb the accepted fundamental framework (Argyris 1986). Defensive routines 'are usually constructed in such a way that they are undiscussable, which implies the most appropriate way of dealing with them is through insisting on a process of reflection and mutual enquiry' (Easterby-Smith et al. 1998, pg 262). Argyris (1986) warned that defensive routines can evolve from an individual and spread throughout an organisation, creating an organisation wide block to accepting new information or blocking of new ideas. As these routines become more widespread in the organisation, they become more effective at hiding underlying problems which can incubate for a longer period of time, ultimately leading to more serious consequences (Senge, 1990).

Smith and Elliot (2007) identify a number of major barriers to organisational learning previously identified and note that barriers to learning can themselves allow a crisis to escalate. Argyris (1976) noted two important areas that can impact the ability of an organisation to learn. One is the degree to which the organisational structure and internal politics impact the creation of valid information for decision makers. The second is how receptive decision makers are to feedback from within. Argyris and Schon (1978) and Turner (1976, 1978) highlighted how deeply held values and ingrained beliefs can limit the ability of an organisation to learn in unexpected situations. Turner (1976, 1978) also noted that organisations can focus on solving well defined problems and ignore vague issues that can later crystallise into problem issues. Argyris (1977) noted a similar issue when discussing organisations that focus on single loop learning. A reluctance to challenge ingrained beliefs and approaches can allow problems to incubate.

Ineffective communication can foster a variety of problems for organisational learning. Janis (1972) coined the term 'Groupthink' which can develop in decision making processes where, in the interests of achieving a consensus, individuals are unwilling to put forward conflicting ideas to the group. It is thought that the greater the cohesiveness amongst the group is the higher then tendency for groupthink to develop (Sasou and Reason 1998). Centralising the decision making process can reinforce core beliefs and also develop problems of bounded rationality (Smith, 1990, 1995). A wider degree of expertise is often required when making more complex decisions than can be provided by any one individual. Organisations can circumvent the problem of bounded rationality by compiling this expertise to allow for wider gathering of information in order to arrive at more informed and efficient decisions (Garciano and Posner 2005).

4.4 Conclusion

Often in the event of a successful strategic change the organization becomes adapted to the point where it begins to stagnate again and the cycle repeats (MacIntosh and Maclean, 1999). This stagnation can prove very damaging and should be avoided to limit the need for repeated dramatic policy shifts. 'In the nature of complex systems we recognise that our concepts of stability and equilibrium need now to recognise that the system under review is not static and equilibrium need not imply there is no movement' (Macbeth, 2002, pg 2). Burlgeman (1991) describes the process of 'strategic renewal' as 'major strategic change preceded by internal experimentation and selection' (pg 28). This occurs where an organisation anticipates the need

for future change and develops new skills and capabilities without advance knowledge of what changes will be made. Burgelman (1991) believed that this approach to strategic change can allow an organisation to be continually informed and indefinitely adaptive.

5 Fitness Landscape Metaphor

“The doctrine of evolution implies the passage from the most organised to the least organised, or, in other terms, from the most general to the most special. Roughly, we say that there is a gradual ‘adding on’ of the more and more special, a continual adding on of new organisations. But this ‘adding on’ is at the same time a ‘keeping down’. The higher nervous arrangements evolved out of the lower and keep down those lower”

– John Hughlings Jackson, *‘Evolution and Dissolution of the Nervous System’*, *British Medical Journal* (1884), I, 662

5.1 Systemic Crisis

This research focuses on events surrounding the Financial Crisis, the impact of which has been seen across organisational and geographic boundaries within the financial system but also into the wider economy. The definitions offered above primarily focus on crisis events from the perspective of individual organisations rather than systemic crisis whose impacts can be felt throughout an industry, and even a wider economy. A systemic crisis can be broken into sections. Immediate damage containment, medium term industry restructuring; and a long aftermath (Claessens et al. 1999). Kotz (2009) argued that the impacts of the financial crisis spread to other sections of the global economy and resulted in a prolonged recessions it should be classed as a systemic crisis. A ‘normal’ crisis within the financial system can be resolved through state bailouts and the creation of some new regulations for the industry. A systemic crisis requires an overhaul of basic approach to capitalism within the financial markets (Kotz, 2009, p. 306). Claessens (1999) described a systemic financial crisis as an event where much or all of bank capital has been exhausted. Frequently these events arise from a large interest rate or foreign exchange shock followed by a general slowdown where asset prices are rapidly depressed, the number of bad loans will sharply increase and the effects begin to be felt in other sections of the economy (Claessens et al. 2001).

A banking crisis is ‘a financial distress that is severe enough to result in the erosion of most or all of the capital in a banking system’. (Allen and Gale 2007, p. 10). These events are all to frequent occurrences within the finance industry. Caprio and Klingebiel (1999) identified 93 separate systemic financial crises in the 1980s and 1990s. Black Tuesday in 1987, the Savings

and Loan scandal in 1991, the 1997 Asian financial crisis, Russia's default in 1998, the Dot.com bubble in 2002 (Reinhart and Rogoff 2009). Minsky describes these events as an inevitable part of a cycle that financial markets experience where stability in markets leads to a self-fuelling increase in confidence that inevitably leads to over-confidence and creates instability in the market. Schumpeter (1942) similarly describes a natural creative destruction in capitalist markets where economic and technological progress emerge from the destruction of old ways of doing things. 'A systemic banking system and corporate sector crisis can be characterised as a situation where an economy faces within a short period of time large-scale corporate and financial distress' (Claessens et al 2001, p. 2).

5.2 Fitness Landscape

The concept of the fitness landscape was developed by Wright (1932) and further expanded upon by Kauffman (1995). The fitness landscape theory is used to investigate biological evolution and self-organisation in cells in biological systems (Kauffman 1995). The theory states that organisms need to reconfigure themselves to respond to challenges and opportunities posed by their changing environment (McCarthy 2004, p.143). It suggests a mode of evolution called adaptive walks, where 'evolution is modelled as a stepwise optimisation process: the genotype of a species is mutated at random and the new genotype is adopted if it leads to a higher fitness' (Derrida and Peliti 1991, p. 355). Wright (1932, p.10) believed that evolution was a gradual process and depended on 'a certain balance among its factors' and that an excessive rate of gene mutation would give rise to 'an array of freaks, not evolution' and if selection became too severe a process it would 'destroy the field of variability, thus the basis for further advance'. Kauffman and Levin (1987, p. 12) believes this theory can be used to explain biological evolution but can be further be used as a basis for 'a general theory of evolution' explaining the gradual process of adaptation by organisms to increase their 'fitness' relative to their environment.

Discussion of Fitness Landscape theory and its application involve frequent reference to the relative fitness of individual organisms. An understanding of the term fitness is necessary, though rarely specified. Stearns (1976) noted that fitness was lacking a definition but appeared to be widely understood nonetheless. Darwinian fitness was widely understood to represent the ability to survive and reproduce. Endler (1986) offered a definition of fitness as 'the average

contribution to the breeding population by an organism or class of organisms, relative to the contribution of other organisms' (Endler, 1986 definition quoted by McCarthy 2004, p. 131). Kauffman and Levin (1987) stated the fitness is not solely a property of the genotype, but is dependent on its environmental context. The frequency of the genotype in within the wider population and the frequency of other genotypes of other co-evolving properties also has an impact on fitness. McCarthy (2004) identifies two elements to fitness from evolutionary biology. First is the capability to adapt and exist, and second is the ability to endure and produce similar systems. McCarthy (2004) subsequently offers a definition of fitness in the context of manufacturing strategy as 'the capability to survive by demonstrating adaptability and durability to the changing environment' (McCarthy 2004, p.129). This McCarthy definition is most applicable when utilizing the Fitness Landscape metaphor as a lens to view the events surrounding the financial crisis.

Kauffman (1993, 1995) explains the Fitness Landscape as a visualisation of how a group of interconnected organisms operating within the same ecosystem evolve and adapt to changing conditions. In biological organisms there is interdependency amongst the genes and in turn a complex relationship between the organisation's genotype and phenotype. Mutations at the genotype level introduce new variants in a population. The phenotype level is the collection of traits that determine the fitness of the organism. At this level differing rates of reproduction determine what mutations are successfully selected. In a complex organism the mutation of a single gene impacts the contribution of the individual gene to the phenotype, but *also* the contribution of all genes which are interlinked with the first one. In order for a particular mutation to be successfully selected the improvement it offers to the phenotype must outweigh any negative side effects that are also created (Kauffman 1991, Frenken 2006). A simplistic explanation of this theory uses a rugged landscape, fixed in nature, where adaption takes place through small changes based on local searches for potential improvements. The organism 'climbs' hills through these gradual mutations in search of local or even global fitness peaks (Wright 1932; Jacob 1983; Kauffman 1993). This hill climb involves a series of random mutations in one element. This adaptive walk model of evolution is visualised as a stepwise optimisation process, overall fitness is increased after each individual mutation and subsequent mutations are based on the new configuration of the organism (Derrida and Peliti 1991; Frenken 2006).

In reality the landscape is not fixed but deforms in relation to changes made in co-evolution of organisms within the landscape and also changes in the wider environment (Kauffman and Levin 1987; Kauffman 1993). Hordjik and Sadler (1998) described the fitness landscape as consisting

of three features. First a usually finite representation set, V , which represents each configuration or individual within the system. Second is a topographical structure, X , that outlines which configurations are 'close' to each other. The combination of V and X is referred to as the configuration space which can offer a visual representation of the proximity of various actors to each other. Finally, there is a fitness function that attributes a value to each configuration within the representation set. In this co-evolutionary process the specific traits and fitness of each individual organism are derived from the configuration of the landscape and by the relationships and interactions between the other organisms or species within the landscape, and these interactions result in all of these continuing to adapt and change.

Adaptive evolution is a gradual process occurring generally through an accumulation of minor variations in an organism's phenotype (Kauffman 1993). In the NK Model developed by Kauffman (1995), N represents the number of elements in the system and K represents the number of connections each element has to other elements in the system (McCarthy 2004). Where $K=0$ there is no relationship or dependency between the elements a singular peak of fitness is produced. The greater the value of K the more the dependency and interactions develop additional fitness peaks also begin to appear. The higher the peaks and the higher the volume of peaks in the NK model the greater the survivability. Adaptive moves by any partner may deform the fitness landscape of other partners (Kauffman and Johnsen).

What this suggests is that survival is not defined solely by the traits of the individual, but by how the individual interacts with the others in the environment and with the environment itself (Martin 2011). The evolution of the individuals impact each other's relative fitness as well as changing the environment itself, and thus the requirements for dominance in that environment.

5.3 The Fitness Landscape and Complex Systems

Complex systems are systems which contain a variety of interconnected elements within a particular structure (Simon 1969). They are dynamic in nature as they must adjust their performance to changing conditions (Hollnagel 1996). As a result of this need to adapt to shifting environmental conditions they are also more prone to instability than linear non-complex systems (Urry 2005). There is a level of the interdependency within complex systems which can result in of minor changes in one area causing unexpected impacts on other areas of

the system (NECSI 2006). Due to the growth of importance and use of information technology, individual organisations and industries have become considerably more interconnected and complex. There has been a shift from what was described as a 'push model', where one or few agents pushed information or products to many unconnected agents (customers) (Mars et al. 2012, p.271). The design and structure of these complex organisations can offer increased efficiency under stable conditions but the level of tight coupling within the system can allow minor problems to escalate as conditions become more complex (Smith, 2005).

A number of authors have suggested that a different approach be taken to view management issues relating to complex organisations as many established approaches to these issues are outdated (Hodge and Coronado 2007; Fischbacher-Smith 2012; Mars et al. 2012). Simon (1962, 1972) was one of the first economists to consider organisational questions through the lens of complexity. Hodge and Coronado (2007) note the need for a new theoretical framework to address issue of change in organisations as the established models are inadequate to assess the nature of interaction in modern organisations. Hodge and Coronado take ideas from the work of physicist Ilya Prigogne and his concept of far from equilibrium conditions. Gunderson and Holling (2002) combined economics theory with the work of a variety of natural scientists in developing their 'Panarchy' model, a framework for explaining adaptive change in natural and man-made systems. Mars et al. (2012) outline how theories relating to ecosystems and evolutionary biology can be used to frame organisational problems. Their suggestion is that a biological ecosystem and an organisational ecosystem exhibit similar qualities in evolution and adaptation involving a variety of players interacting and linked by a variety of flows of resources and information (Mars et al. 2012).

Kauffman's Fitness Landscape theory has been suggested as a means of assessing the behaviour of organisations operating under complex circumstances (McKelvey 1999, Fischbacher-Smith 2011). Kauffman (1993, p. 237) stated 'organisms do not merely evolve, they co-evolve both with other organisms and with a changing abiotic environment'. In a co-evolving landscape there is interdependence between players, changes made by an individual organisation will impact not only their performance but also the topology of the landscape (McCarthy 2004). Complexity is both a cause and a consequence of these relationships (McKelvey 1999). At the core of this view is that organisations aim to develop particular capabilities that allow them to succeed in the prevailing conditions they are operating in. However, these environmental states are known to be unstable and a shift in the environment may result in these capabilities becoming outdated. Organisations need to have sufficient adaptive capabilities to respond to

these environmental changes in order to maintain their performance level (Fischbacher-Smith, 2011, p.30). Kauffman (1995) describes the narrow gap between complexity and chaos, 'the edge of chaos', where the most complex interactions can occur. These conditions foster evolutionary leaps, but they also allow complexity to become chaos and order to be lost (McKelvey 1999).

5.4 Applications of the Fitness Landscape

Martin (2011) suggests that theories and methods developed for evolutionary biology can be used in social sciences to help with the understanding of group dynamics and behaviour. McKelvey (1999) states that the views of both Porter (1991) and the resource-based-view (Teece 1984; Barney 1991) argue that a firm's interactions with other organisations within the same competitive environment impact on the firm and helps create and develop specific capabilities that can offer competitive advantages. Allen (2001) discusses system diversity in relation to organisational survival and Nohria and Gulato (1996) note the need for more internal variety within an organisation than needed to maintain current performance levels in order to retain the ability to respond to unexpected threats.

Management and organisational sciences have attempted to make use of the Fitness Landscape theory in various other areas, including organisational change (McKelvey 1999), evolution of organisational structures (Levinthal 1996), technology selection (Frenken 2006) and development of resilience (Fischbacher-Smith 2011). Comparisons have been made between self-organising structures in natural settings and how organisations organise and adapt to their surroundings (Stacey 1995). McCarthy (2004) maps basic strategic analysis and change to the fitness landscape theory. The three questions that form the process of strategic change are:

1. Where are we currently positioned on the landscape (Strategic process)
2. Where do we want to be on the landscape (Strategic choice)
3. How do we get there (Implementation)

When exploring the landscape there are two basic strategies. First is a local search where firms can investigate the different strategies used in their immediate locality, one mutation removed. Adjustments made on this basis allow a firm to move toward a local fitness peak. The second approach is to expand the search and look at differing strategies used further afield

(McCarthy, 2004, p. 145). This approach is aimed at moving toward a global fitness peak. However proceeding directly to the second approach will require a large reconfiguration of the firm's strategy rather than the more gradual evolution that would be experienced with the first approach (Tushman and Romanelli 1985). Strategic change will initially require a downhill journey that is likely to reduce the firm's performance. Due to this performance reduction many firms will halt the strategic change efforts and return to their previous position. MacIntosh and MacLean (1999) referred to this period of uncertainty during strategic change as the 'bifurcation zone', a phrase they borrow from the work of the physicist Ilya Prigogine.

Previous work in the area of crisis has highlighted the inevitability of crisis events and the manner in how they can develop. Interlinked complex organisational systems, by the nature of their construction and interactions, generate potential for crises develop and overwhelm their defences (Fischbacher-Smith and Fischbacher-Smith 2009, p.1). The literature on crisis events discusses how tiny initiating events (Bea 1998) can emerge and incubate (Turner 1976, 1978) within organisations. If these early warnings (Reason 1990) or weak signals (Turner 1976, 1979) are missed, vulnerable pathways (Smith 1990) can be created and these issues can move the gaps in the organisational defences (Reason 1990). Bea (1998) and Weick (1995) discuss the need for organisations to recognise and make sense of these events as they unfold in order to limit their potential impact. McCarthy (2004) similarly notes the need for a firm to recognise the change in environmental conditions and to understand their own routines and resources in order to create new internal strategies or configurations.

Organisational crises by definition result in a change in environment as the task demands of such an event are outside of the normal capabilities of the organisation. Grenier (1972) argued that crises are inevitable over the course of an organisation's growth and evolution. Vaughan (1999) outlined how prior to the Challenger Shuttle crash, over an extended period of time, the acceptable risk parameters widened in NASA as other organisational concerns were given more focus. Taleb (2012) acknowledges the inevitability of these unexpected events and recommends organisations attempt to develop adaptive capabilities, coining the term 'anti-fragility' - the opposite of fragility. He praises organisations with the necessary abilities to respond positively to, and benefit from unexpected and potentially damaging conditions. Minsky's (1986, 1992) financial instability hypothesis discusses the inevitability of stressed conditions in financial markets. This hypothesis suggests that a prolonged period of stability leads to instability as confidence grows there is a move from the safer 'hedge' investments to riskier speculative investments, and ultimately to unstable Ponzi style investments (Minsky 1992).

The Fitness Landscape can be used to illustrate the interactions, interconnectivity and interdependence of organisations operating within the same system (Fischbacher-Smith 2009, p.27). The Fitness Landscape operates across three states: Stable; Complex; and Chaotic. When the environment is 'stable' organisations are competing against accepted and understood parameters. A more complex environment requires a more specific set of skills in order to thrive under these conditions. Organisations that adapt quickly to these conditions will gain an advantage. The fitness peak at this point represents the high-water-mark or ideal set of capabilities required to operate under the current environmental conditions. In a complex environment the conditions are by definition more dynamic requiring the organisation to continually change and adapt to the ever changing fitness peak (Kauffman 1995). Movement back and forth between these states is referred to as a 'phase transition' (Kauffman 1993, p.30). Kauffman (1995, p. 26) further explains that the point between complex and chaotic, the edge of chaos, is where the most complex behaviours can occur. The system retains enough order to ensure stability, but also contains the flexibility and adaptive capabilities necessary to evolve. It is also the point where the system is at its most vulnerable and can lead to a spiral into a chaotic state (Fischbacher -Smith 2009, p.31).

5.5 Limitations

Carpenter et al (2001) discuss the adaptive cycle as a useful metaphor in assessing resilience in socioeconomic systems, but not as a testable hypothesis. They further suggest that many theories are not definitively testable, but that their success is measured by the impact they have on further research. Mars et al (2012) caution that much of the development of the organisational ecosystem framework has been developed without the input of ecosystems ecologists, and may be unreliable. Additionally they comment that researchers must be careful not to extend the metaphor too far as there are numerous differences between ecological and organisational ecosystems. Kauffman (1993) outlines how economic models based on the Fitness Landscape theory could give an indication as to how the economy might work if the information was in the same universality class, if it exhibited the same robust behaviour. Haldane (2009 p. 1) when discussing the Financial Crisis noted the dangers of over reliance on a models to give specific information. An overreliance on abstract models can provide a false sense of security

and confidence. Haldane referenced the old adage of it being 'better to be roughly right than precisely wrong'.

5.6 The Financial Crisis and the Fitness Landscape

A number of causal factors have been highlighted in relation to the financial crisis, most notably: deregulation; over-reliance on flawed metrics and complex financial products; misaligned incentives; greed; and paradigm blindness (Haldane, 2009, Wray, 2007, Nyberg, 2011). Taleb et al (2009), referring to the crisis as a Black Swan event, described how the financial industry failed to learn from previous crises that these major events cannot be predicted. Keen (2011 p. 1) disagrees with this sentiment believing the crash was not only predictable 'but an almost blindingly obvious certainty'. In support of his argument Keen references Minsky's Financial Instability Hypothesis which suggests that a prolonged period of stability leads to instability as confidence grows there is a move from the safer 'hedge' investments to riskier speculative investments, and ultimately to unstable Ponzi style investments (Minsky 1992). These three stages link with Kauffman's states of stable, complex and chaotic within the Fitness Landscape.

Haldane (2009, 2012) describes the financial network as a complex adaptive system. It was complex 'because these networks were a cat's cradle of interconnections, financial and non-financial' (p.3). And it was adaptive because 'behaviour in these networks was driven by interactions between optimizing, but confused, agents' (p. 3). Like a biological ecosystem, the financial industry involves separately functioning compartments (sectors, organisations, subsidiaries, etc.) that are interlinked by flows of resources and information (Mars et al. 2012). Kaufmann (1995, p. 281) compares an interdependent and transforming economy with an 'ever-transforming biosphere' where the dominant players are eventually replaced as the landscape changes. Various innovations compete until a few dominant players are chosen and the others go extinct. Subsequent co-evolution within the economy leads to further technological advances and a repeat of the innovation process.

The complex adaptive systems view posits that strategy is a continuously and consciously evolving system of routines, resources, capabilities and competencies that co-evolve with the strategies of competing organisations. By virtue of this any change that leads to an improvement

in the strategy or fitness of one organisation leads to relative decline in the fitness of their competitor. These competing firms are then required to make changes in order to maintain their relative fitness (McCarthy 2004). Van Valen (1973) termed this the Red Queen effect in reference to the character in Alice and Wonderland who commented that 'it takes all the running you can do to keep in the same place' in a fast moving world. Technological advances within the industry allowed for more complex products to be packaged and sold and an assumption that risk was successfully managed. As this area of financial markets became more successful other financial organisations raced to adapt to these new environmental conditions by creating ever more complex products, sold in larger quantities through a variety of subsidiaries in order to achieve the maximum benefit out of the prevailing market conditions (Tett 2010, Wray 2008).

However, over a period of time the perception of what the dominant set of conditions were became increasingly divergent from reality. The nature of the products offered and the continued leveraging of their individual and collective holdings was done on the back of an incorrect understanding of the environment. Any attempts to challenges to the worldview of people working within the financial industry were ignored or quickly refuted (Rajan 2004, Wray 2009). The industry as a whole had essentially adapted to the wrong environmental conditions (Greenspan 2010, Morris, 2011). In the years prior to the financial crisis the changes in the financial system had allowed two characteristics to become dominant in the industry 'complexity and homogeneity'. The growth of complex derivatives and other financial instruments, as well as the ubiquity of complex risk metrics used by financial institutions and rating agencies allowed a misplaced confidence to develop within the industry. The homogenous industry response to a burgeoning crisis, the attempted fire sale of troubled assets and hoarding of liquidity, actually exacerbated the impacts of crisis (Haldane 2009). 'The evolution of the organisations within the financial market, and of the market as a whole, allowed these latent weaknesses to quietly develop and incubate within the system awaiting a trigger event' (Haldane, 2009). When the cracks began to show there was a dramatic and rapid phase transition to a chaotic situation as these organisations scrambled initially to understand what the requirements of this changed environment was and then attempt to adapt to the new task demands (Greenspan 2010; Tett 2010; Turner 2009; Wray 2007, 2008).

5.7 Conclusion

Following major financial crashes in 1987 and 1992, Minsky (1993) explained how ‘evolution is not necessarily a progressive process, the financial evolution of the past decade may well have been retrograde (Minsky, 1993, p. 113). In 2005, Rajan was widely dismissed when he suggested that the dramatic growth of the derivatives market was also increasing risk exposure throughout the industry, and could have a potentially destabilising effect on both the financial industry and the wider economy. Wray (2009, p.821) in his review of the events preceding and contributing to the financial crisis discussed the impact of regulatory changes and growth of complex products and noted ‘the nature of finance had changed in a fundamental manner so that it would evolve toward fragility. However Minsky’s Financial Instability Hypothesis suggests events like this are part of a cycle that will repeat itself. How can crisis events in a complex industry like the financial services be avoided, or limited in the future?

Haldane (2012, p.24) remarked ‘Modern finance is complex, perhaps too complex. Regulation of modern finance is complex, almost certainly too complex. That configuration spells trouble. As you do not fight fire with fire, you do not fight complexity with complexity. Because complexity generates uncertainty, not risk it requires a regulatory response grounded in simplicity, not complexity’. McCarthy (2004) notes the need for organisation’s to recognise the trade-off between efficiency and adaptability (p. 144). However, the Fitness Landscape can be used as a means of developing ‘a more detailed understanding of the process by which an organisation can move, or be moved, from their equilibrium states’ and understanding the need for organisational resilience when operating in a complex environment. (Fischbacher-Smith, 2011, p.1).

6 Methodology

6.1 Introduction

The choices relating to research strategies, design and method should primarily be led by the specific research question being investigated (Bryman 2008). Seale (1999) highlights the potential dangers of focusing too intensely on methodological considerations at the expense of practice, although he does note that benefits of understanding and utilizing the correct methodological approach in order to avoid unnecessary pitfalls. The research problem will impact ontological decisions (objectivism or constructivism) which in turn will impact on epistemological approaches and ultimately will help decide the context and specific approaches of the research (Bryman 2008). In terms of qualitative research the research question, relevant literature and research design are interrelated and evolve through the project (Marshall and Rossman 1989). Other practical issues should also be taken into account when developing the research methodology such as time, financial requirements and access to relevant individuals or organisations (Ritchie and Lewis 2003). In designing a research project the reader must be convinced that the researcher has the competence to undertake the research, justify the choice of research design and demonstrate the ability to employ the methods selected (Marshall and Rossman 1989). This chapter aims to outline and justify the methodological choices made by the researcher, to explain the data collection methods to be used, and to describe the approach taken to analysing the data collected.

This research focuses on the internal structures and communications of complex organisations in order to develop a theory of managing unfolding crises. The financial sector and the events surrounding the financial crisis of 2007 / 2008 will be the focus of this research. There is a large volume of information already in the public domain following of a variety of government led investigations into the industry as a whole, and to some individual organisations. The researcher aims to assess the approaches to crisis management within these organisations, highlight errors which contributed to the Financial Crisis and identify organisational skills and traits best suited to managing unfolding crisis events. This research uses the metaphor of the Fitness Landscape as a lens to look at performance. Quantitative approaches to complex interactive systems can be of limited value as they can assume an independence of events and limit the prominence of extreme events (McKelvey and Andriani 2005). A quantitative approach is not readily applicable

because a) a lack of data granularity and b) difficulties of controlled variables. Due to these factors a qualitative approach is deemed to be more appropriate in this circumstance.

In light of this it is necessary to offer a definition of qualitative research and what it involves. A variety of definitions noting the manner of approach and the relevant characteristics of qualitative research have been suggested by researchers. Shank (2002, p. 5) defined qualitative research as 'a form of systematic empirical inquiry into meaning'. Strauss and Corbin (1998, p.11) described qualitative research as 'any type of research that produces findings not arrived at by statistical procedures or other means of quantification. Bryman (2008, p. 366) describes qualitative research as a research strategy that 'emphasises words rather than quantification in the collection of analysis of data'. Ritchie and Lewis (2003, p.3) highlight some characteristics of qualitative research noting it to be a 'naturalistic' and 'interpretative' approach that is predominantly concerned with 'understanding the meanings which people attach to phenomena (actions, decision, beliefs, values etc.) within their social world'.

Quantitative research attempts to bring a very narrow defined issue into a sharp focus, qualitative research is a lens to examine a much broader issue providing a less sharp focus on it (McCracken 1988). According to Denzin and Lincoln (2011, p.3) 'qualitative research locates the observer in the world' allowing them to 'study things in their natural settings, attempting to make sense of or interpret phenomena in terms of the meanings people bring to them'. Ospina (2004, p. 8) notes how qualitative research can be used to allow a researcher to 'attain a 'glimpse of the world' and highlights a number of reasons to use qualitative research including:

- To advance a novel perspective of a phenomenon well studied quantitatively but not well understood because of the perspectives used before.
- 'To try to 'understand' the any social phenomenon from the perspective of the actors involved rather than explaining it (unsuccessfully) from the outside.
- To understand complex phenomena that are difficult or impossible to approach or to capture quantitatively.
- To understand any phenomena in its complexity, or one that has been dismissed by mainstream research because of the difficulties to study it, or that has been discarded as irrelevant, or that has been studied as if only one point of view about it was real.

6.2 Theory Building

A well-researched and constructed theory offers a model that explains why the world operates in a particular way, while it is undoubtedly a simplification it offers enlightenment, giving insight and broadening understanding of a particular phenomenon (Strauss 1995, Anfara and Mertz 2006). A number of writers have previously suggested approaches to developing theories through qualitative methods (Glaser and Strauss 1967; Turner 1981, 1983; Eisenhardt 1989; Ritchie and Lewis 2003). According to Agnew and Pyke (1969) good theory should be simple; testable; novel; supportive of other theories; internally consistent and predictive. 'Grounded theory approach is likely to be of maximum use when it is dealing with qualitative data of the kind gathered from participant observation, from the observation of face-to-face interaction, from semi-structured or unstructured interviews, from case-study material or from certain kind of documentary sources' (Turner 1981, pg. 227). Eisenhardt (1989) offers a guideline to building theory through case studies and outlines the process by which it can be approached:

- Definition of Research Question
- Selection of cases
- Confirming data collection methods
- Entering the field
- Analysing data
- Shaping Hypotheses
- Comparing and contrasting findings with literature

There are more theories in social sciences than there are in natural sciences with many of them competing with each other. Theories developed in natural sciences generally require a higher degree of consensus in order to gain acceptance and it is rare that a new theory 'replaces' another causing a paradigm shift in the discipline (Kuhn 1970). In social science competing theories can be drawn from a variety of different disciplines (political science, economics, biology, physics, sociology). Viewing the same events through different lenses can result in a variety of reasoned and defensible theories developing to explain the same phenomena (Anfara and Mertz 2006, p.xviii).

6.2.1 Project Overview

The aim of this research is to examine the banking crisis through the lens of the fitness landscape metaphor. Because the growth of the industry mirrors in many ways how evolution is described within evolutionary biology, particularly in the Fitness landscape model. The environment (landscape) changed based on the actions of the organisations operating within it. Changes made by one organisation impacted on the structure of the landscape itself and what was considered optimal at any given time. Changes by one organisation have a direct impact on the 'fitness' of other organisations operating within the same landscape. These organisations were forced to adjust their own outputs to adapt to a changing environment in order to maintain or even increase their level of fitness. This competition to occupy a local or global fitness peak was an ongoing process and required constant adjustments by organisations within the landscape. The capabilities developed and the direction of resources became more focused on competing for this fitness peak that a change in the environment occurred unnoticed. When it became apparent the landscape had shifted and the fitness requirements had changed many organisations did not have the capabilities to adapt to the new environment.

With particular focus on the financial crisis this research aims to investigate how to manage sudden phase transitions in complex systems. In doing this the researcher aims to:

4. Assess to what extent is the banking crisis a function of internal fitness or external threats?
5. Explain how selected firms in the financial services industry evolved to a particular set of environmental conditions, but were unable to adapt to a sudden and dramatic shift in these conditions.
6. Examine the changes made within the financial industry generally, and specifically in relation to selected firms, following the commencement of the financial crisis and explore whether the system has developed resilience to future unexpected environmental changes.

Additionally the research hopes to identify particular management traits, organisational capabilities and skills which are beneficial to managing in times of great uncertainty, and how these traits can be developed and maintained within an organisation during times of stability in order to help during periods of uncertainty and high pressure?

6.2.2 Justification of Philosophical Stance / Theoretical Paradigm and Perspective

The combination of the researcher's epistemological and ontological views have been termed the paradigm (Guba 1990) or interpretive framework (Denzin and Lincoln 2011) that guides the work carried out by the researcher. Bryman (2008, p. 697) defines a paradigm as 'a cluster of beliefs and dictates that ... influence what should be studied, how research should be done and how results should be interpreted'. The following section offers a brief overview of the main ontological and epistemological perspectives are in order to explain the choices made by the researcher.

Ontology is concerned with the nature of the world and what there is to know about it (Ritchie and Lewis 2003) and 'the worldviews and assumptions in which researchers operate in their search for new knowledge' (Scwandt 2007, p. 190) querying what the nature of reality is (Cresswell 2007). At their core these discussions query whether the world exists independently of the perceptions of individuals and can be understood and governed through a series of generalisable laws, or if there are a variety of context specific realities resulting from the actions of individuals and continuously changing based on the perceptions of these individuals (Bryman 2008, Ritchie and Lewis 2003). The prime source of divergence in discussions of ontological approaches focus on the distinction between objectivism and constructivism, although the terminology used to describe these ideas can differ between various researchers (Bryman 2008, Denzin and Lincoln 2011, Ritchie and Lewis 2003)

Objectivism or realism 'asserts that social phenomena and their meanings have an existence that is independent of social actors' (Bryman 2008, p. 696). Advocates of objectivism are of the opinion that a definable and understandable reality exists outside of an individual's perceptions, beliefs and understandings (Ritchie and Lewis 2003). Researchers who follow this idea predominantly conducted research using quantitative methods as they use models and statistics to use (Denzin and Lincoln 2011). In contrast to objectivism a constructivist approach does not assume there is one single correct world view but that 'social phenomena and their meanings are continually being accomplished by social actors (Bryman 2008 p. 692). Lincoln and Guba (1996) suggests multiple realities exist which are dependent on and constructed by the individual. The researcher and the subject(s) of the research impact each other. The research conducted is subjective and influenced by the values, experiences and perspectives of the researcher, who can declare these biases in advance to retain transparency (Ritchie and Lewis 2003). Research conducted from this perspective is more likely to use qualitative methods (Ospina 2004).

Epistemology concerns what knowledge is considered acceptable in a discipline (Bryman 2008) and ‘the relationship between the enquirer and the known’ (Denzin and Lincoln 2011). Positivism is a purely objective approach that utilises the ideas and practices of natural sciences (Bryman 2008). Advocates of this idea approach believe there is a ‘reality out there to be studied, captured and understood’ (Denzin and Lincoln 2011, p.8). The world is independent of the researcher and is not affected as a result of the research. Only knowledge that can be directly confirmed by the senses is considered valid. Knowledge is attained through the gathering of verifiable facts that provide the basis for testable hypotheses (Bryman 2008, Ritchie and Lewis, 2003). The positivistic vision seeks ideas that have universal validity independent of human actions. It seeks to be neutral from the researcher’s values and uses specific measurement criteria to demonstrate causal links and replicability (Seale 1999).

An alternative view, ‘post-positivism’, argues that ‘reality can never be fully apprehended, only approximated’ (Denzin and Lincoln 2011, p.8). The use of positivistic empirical approaches to research in social sciences have been rejected by some as they have failed to develop dependable predictions nor provided solutions to problems presented in society (Fischer 1998). Seale (1999) suggests a positivistic view is untenable in social sciences as it ignores the role of the individual(s) observed and the relationship between the researcher and their subjects. Post-positivism acknowledges the role of subjectivity and interpretation and utilises it as part of any analysis.

Another perspective is Realism (sometimes referred to as Critical) which claims that there exists an external reality in the world, independent of the senses and separate from the internal beliefs and biases of the individual (Bryman 2008, Denzin and Lincoln 2011). There are various interpretations within ‘realism’ suggesting different ways of understanding knowledge. Empirical realism proposes that a reality exists that can be understood through the use of the correct methods (Ritchie and Lewis 2003). A different view is ‘Critical Realism’ which agrees with the positivist view that there is an observable world which exists independently of human consciousness and seeks to identify the structures that govern this world. However, it is anti-positivist as it believes that once identified these structures can potentially be altered to counteract imbalances. It views this observable world as socially constructed where reality exists in and is arranged in a variety of levels (Denzin and Lincoln 2011, Bryman 2008).

Ritchie and Lewis’ (2003) discussion of interpretivism includes reference to Immanuel Kant’s view of knowledge. Knowledge is not solely based on senses but additionally how people

interpret what the messages received by their senses. Reflection on experiences informs knowledge as much as the experiences themselves. Knowledge can transcend purely empirical enquiry.

Qualitative research is ‘predominantly an inductivist, constructionist and intepreivist strategy’ (Bryman, 2008, p.366). This will be the case with this research as it has been outlined above. A constructivist ontological approach is deemed more suitable as the causes, sequences and results of these events differ between individual organisations making the experiences of those involved very subjective. An inductive interpretivist epistemology is considered to be the most applicable approach as the research will be presented as collection of comparable case studies and the data has been collected through semi-structured interviews and secondary analysis of documents already in the public domain. The design of the research and justification for the data collection methods are detailed in the next section.

6.3 Research Design and Strategy

‘A strategy of inquiry puts paradigms of interpretation into motion’ and a research design should be a ‘flexible set of guidelines that connect theoretical paradigms first, to strategies of inquiry and second, to methods of collecting empirical material’ (Denzin and Lincoln 2011, p. 14). Quality is a goal of qualitative research but can prove to be a difficult concept to agree upon and is not guaranteed by adherence to pre-specified methodological decisions (Seal 1999). Popularity and acceptance of particular qualitative methods evolve over time and concepts of validity and reliability of research are impacted by these changes (Denzin and Lincoln 2011, Seal 1999). Lincoln and Guba (1985) suggest a number of criteria that quality research must meet. Firstly credibility should be demonstrated by exposure of the work to criticism through an independent process of peer reviewing and reformulation of the findings based on input through this process. Secondly transferability, a detailed description of the settings and conditions surrounding the inquiry should allow the reader to determine the applicability of the research to other circumstances. Thirdly dependability of the research should be determinable by a detailed inclusion of the process by which the data was sourced and interpreted. Finally confirmability of findings can be demonstrated through a reflexive approach by the researcher covering all aspects of the work in order to verify that the conclusions are defensible.

6.3.1 Case Study

This research is framed as a comparative case study approach focusing on 3 financial institutions that have had different experiences during and following the financial crisis. Ritchie and Lewis (2003 pg. 52) recommends the use of case study in situations where ‘no single perspective can provide a full account or explanation of the research issue, and where understanding needs to be holistic, comprehensive and contextualised’. Bryman (2008) discusses a basic case study design as a detailed analysis of a single case but highlights the limitation of this approach as the findings may have limited external validity or generalisability as the events / situation focused on are so idiosyncratic. Yin (2003) suggested potential approaches to case studies to help increase robustness. He recommended researchers identify any sources of bias, acknowledge them and make efforts to minimize their impact, develop a case study protocol and a case study database to manage all data collected to aid with analysis.

In order to limit these concerns a comparative case study design is deemed more robust and more suited to this research. The comparison of multiple cases allows for a more detailed understanding of the social reality of the events across different contexts (Hantrais 1998). The use of the multiple case study approach has increased within organizational research and is particularly helpful in any attempt at building theory as it allows the researcher to explore the validity of a proposed theory in multiple settings (Eisenhardt 1999, Yin 2003). With multiple cases comparisons can be made between different actors within a single case, between cases and between groups of actors across different cases (Bryman 2008). Potential dangers and pitfalls of utilizing the comparative case study design have also been noted. Dyer and Wilkins (1991) noted that the use of multiple case studies can lead to a researcher focusing too much on the comparable aspects of the cases and ignoring some of the wider context. Ritchie and Lewis (2003) warn of the potential for large overall samples when attempting to include the all the key players and the difficulty that can cause when analyzing the data.

It is envisioned that the differing experiences of these three organizations will allow detailed and comparable data to aid with generating ideas for future use. Below is a brief summary of the three institutions who are the subject of this research, and how the Financial Crisis impacted them:

- Anglo Irish Bank grew from a valuation of €2 million in 1987 to a peak of €10.7 billion in 2007. By January 2009 the bank had been nationalized by the Irish government and it was agreed to wind down the institution over a period of 10 years. In April of 2011 the

cost of the failure of Anglo Irish Bank had been estimated at €34.3 billion to the Irish taxpayers (Carswell 2011).

- Royal Bank of Scotland (RBS) 'failed' in October of 2008 and required an injection of £45.5bn of equity from the British Government to prevent its collapse. An FSA report entitled 'The Failure of the Royal Bank of Scotland' from December 2011 (FSA 2011) examines the reasons behind the failure outlining a variety of internal structural issues, poor management and the impact of an overall systemic financial crisis. In Dec 2012 RBS remains 65.3% owned by the British Government, has been required by the EU to divest itself of a large portion of its branch network and various subsidiaries (RBS 2012). RBS recorded profits in quarter 1 of 2013, the first time this was achieved since the onset of the Financial Crisis (RBS 2013).
- Santander Asset Management UK's (SAM UK) investment model was more cautious than that of many other major banks and retained sufficient liquidity that they were not endangered by the events of 2007 / 2008. The Santander Group have expanded, both within the UK and internationally, by purchasing other financial institutions (Alliance and Leicester and Bradford and Bingley) and divisions from competitors who had struggled in the wake of the financial crisis, including from RBS and Anglo Irish Bank (Santander 2013).

6.3.2 Data Collection

Data was gathered through a combination semi-structured interviews with people directly involved in each institution, at operational, management and supervisory levels. The interviews focused on the risk structures that were in place prior to the Financial Crisis, the events of 2008 and subsequent changes in both the industry and the individual organizations. An interview can be a particularly revealing tool of inquiry, potentially offering an insight into the daily pattern of the candidate and offering a view of how they see the world (McCracken 1988). Fylan (2005) recommends the use of semi-structured interviews to find out 'why' rather than 'how many'. In this case the goal is to examine the impact of the financial crisis on a number of financial organizations, 'why' certain organizations thrived and some suffered worse than others. Use of the semi-structured interview approach will allow for the 'conversation' to flow and vary between participants (Fylan 2005). Kvale (1996, p.6) defines a semi-structured interview as 'an interview whose purpose is to obtain descriptions of the life world of the interviewee with respect to interpreting the meaning of the described phenomenon'.

Kvale (1996) notes a common critique of interview based studies is that the findings are too narrow to be generalisable as a result of insufficient interview subjects. It is recommended to focus on quality over quantity, ensuring expertise in the subject matter on the part of both the researcher and the interview subject. Williams (2003) highlights potential difficulties in carrying out qualitative interviews. He recommends the interviewer ensure the participant feels comfortable and safe in their environment. The interviewer also needs to be able to steer the conversation without leading the candidate and clarify any ambiguous points that are made in order to reduce uncertainty. Marshall and Rossman (1989) highlight the importance of role management when interacting with interview subjects. Certain roles need to be played in order to gain the acceptance and trust of the candidates. Additionally some candidates may need more detailed explanation of what the research is and what is required of them as participants. However, it has also been noted that the semi-structured interviews allows for a certain degree of flexibility to investigate the impact of smaller emergent problems that might have had a larger impact on the organization. Similar 'small' issues have been of notable importance in previous research in crisis management (Smith 1992; Vaughan 1996; Turner 1976).

Secondary data analysis will be used in addition to the case studies. Detailed public investigations have been carried out by the FSA into the financial industry as a whole, and into individual financial institutions (FSA 2011). The use of secondary data has been discussed by a number of writers (Bryman 2008, Dale et al 1988, Law 2005). Some potential ethical concerns raised focus on the data confidentiality, potential harm to the individuals who were the focus of the original research and the potential to cause harm to the original research (Law 2005). These reports are publicly available and the details of these investigations will be used to supplement the interviews carried out by the researcher and to provide background context relating to the financial crisis, its causes and any regulatory changes made to within the industry as a result of these events.

6.3.3 Sample Selection

Following detailed consultation with my supervisory team it was agreed that the organizations discussed above would provide suitable comparative case studies for this research. Access to SAM UK was organized through personal contacts with individuals employed there. The researcher was permitted to conduct interviews with relevant members of staff from a variety of different departments. Anglo Irish Bank has ceased trading and has been merged with another failed financial institution into the Irish Banking Resolution Corporation (IBRC). The researcher

is personally acquainted with an employee of the IBRC who was willing to be interviewed regarding his experiences with the institution. Due to ongoing civil and legal proceedings access to former Anglo Employees proved impossible. The researcher relied on information in the public domain which included direct interviews with various stakeholders. These sources included independent investigations conducted by the Central Bank of Ireland and the Irish Government. In addition to these sources two books written in the aftermath of the Financial Crisis included interviews directly attributed to senior stakeholders in the institutions. These books were also leveraged to support some of the findings. Similar issues were faced with access to RBS employees. An interview was conducted with a senior government official who was in a regulatory position during these events. Investigations commissioned by FSA and Bank of England were also leveraged to support details around RBS' experience.

6.3.4 Interviews

Interviews focused generally on the individual's experiences during the financial crisis and the changes that have been made within their organisation and the wider industry as a result. The goal is to carry out interviews with individuals who worked in a variety of roles (i.e. Risk Management; Traders etc.) in order to gain different perspectives on the topics discussed below. Efforts were made to avoid leading questions to limit influencing the response of candidates (Kvale 1996). McCracken (1988) warns of the dangers of the researcher's preconceptions, nothing how important elements and ideas can be missed if certain aspects are taken for granted. Ritchie and Lewis (2003) recommend the following broad approach to semi-structured interviewing:

1. Begin the interview with topics designed to ease participants gently into the interview. Initial questions should be unthreatening and straightforward to answer. The aim of this approach is to make the person at ease with the process, give them an understanding of the style of the interview and to get them talking.
2. After the initial period of settling the interview candidate the questions can move from general to more specific topics. The questions can become more focused and the discussions can become more in depth.

3. Toward the end of the interview the interviewee should be allowed to give an overview of their thoughts, discuss any changes in opinion they may have had and to 'mop up' any final thoughts the interviewee has.

The specifics of the interview guide for this research is based on the model presented in *Undermining Resilience: An Act Away from Equilibrium* (Fischbacher-Smith 2012) the interviews covered the following broad areas:

1. Core Beliefs and Values
 - a. Individual
 - b. Organisation
 - c. Regulators and Government
2. Structures / Networks
 - a. Internal / External
 - b. Formal / Informal
 - c. Changes to these under stable / complex conditions
3. Control
 - a. Governance
 - b. Role of regulators
 - c. Role of the above in day-to-day running of the organisation
4. Decision Making
 - a. Under stable / complex conditions
 - b. RM / CM Planning
 - c. Internal communication of above

The interview guideline used is attached as Appendix I.

6.3.5 Secondary data analysis

Secondary data analysis will be used in addition to the case studies. A number of public inquiries have been undertaken into the financial crisis as a whole, and the role of individual institutions. These reports and their supporting documents will be used to provide supplementary data to that discussed above. These reports include:

- *The Turner Review: A Regulatory Response to the Financial Crisis* (FSA, March 2009)
- *The Failure of the Royal Bank of Scotland* (FSA, Dec 2011).

- *The Financial Crisis Inquiry Report* (The US Financial Inquiry Commission, January 2011)
- *Misjudging Risk: Causes of the Systemic Banking Crisis in Ireland* - aka The Nyberg Report (Commission of Investigation into the Banking Sector in Ireland, March 2011)

6.4 Data Analysis

Qualitative research can generate large volumes of cumbersome data that can be very difficult to organize and analyse properly (Bryman, 2008). Ritchie and Lewis (2003, p. 199) also highlight to the difficulty of analyzing large volumes of data and refer to the need for ‘a mix of creativity and systematic searching, a blend of inspiration and diligent detection’. Denzin and Lincoln (2011) recommend using a wide range of interpretative practices to ensure a comprehensive understanding of the data gathered. Eisenhardt (1989) refers to theory building from case studies as an iterative process and also discusses the importance of analysis of data. She recommends parsimony and simplicity and notes the temptation to use the volume of rich data from specific case studies to develop theories that are not applicable to the wider field.

A variety of different approaches to analyzing qualitative data have been outlined and recommended by various studies (Pettigrew, 1988, Mintzberg and McHugh, 1985, Miles and Huberman, 1994). It has been highlighted that the use of an impressive technique will not mask poor-quality work (Turner, 1981). Eisenhardt (1989) makes a similar point when discussing many of the techniques previously used by researchers in analyzing data and summarized that ‘the overall idea is to become intimately familiar with each case a standalone entity. This process allows the unique patterns of each case to emerge before investigators push to generalize patterns across cases’ (Eisenhardt, 1989, pg. 540). Kvale (1996) discusses five approaches to interview analysis to give a more structured approach.

- Meaning condensation
- Meaning categorization
- Meaning structure through narratives
- Meaning interpretation
- Ad Hoc meaning generation

Following data collection all interviews were transcribed and initial themes and concepts noted. The data was coded using NVivo software to aid the process of comparison. The interviews were reorganized under the different categorizations in order to summarise the evolving themes. Categories were refined as the data was further analysed. Patterns and relationships between the categories were analysed to generate further hypotheses. These hypotheses can be tested against the wider literature for verification (Bryman, 2008, Ritchie and Lewis, 2003, Miles and Huberman, 1994, Turner, 1983).

6.5 Ethical Implications

It is essential for the ethical implications of any research to be taken into account in order to ensure no harm comes to any participants, and also to ensure validity of the research itself (Walliman 2006, Bryman 2008). Marshall and Rossman (1989) raise questions that should be asked to ensure ethical considerations are given due focus prior to interaction with participants. The researcher should question whether their intended strategy will violate the privacy of cause and disruption to the participant's life, whether if there is any risk involved in participation of if their human rights could potentially be violated in any way. Williams (200 p. 156) states that 'we should not conduct such research that will create harm or distress, even though the outcome might well be beneficial to a wider group'. The British Sociological Association issued a number of guidelines for good ethical practice in research. The highlighted a number of issues that researchers should concern themselves with when undertaking research involving people. These include professional integrity; relationships and responsibilities towards participants; issues of anonymity and confidentiality and the need to clarify obligations, roles and rights of all participants (British Sociological Association 2002).

Ritchie and Lewis (2003) also highlight some of the practical ethical concerns around informed consent and anonymity and confidentiality that may arise during qualitative interviews. There has been widespread media coverage and public anger regarding the financial crisis and the institutions involved. The FSA was compelled to carry out a complete investigation of RBS to satisfy public demand (FSA 2011). Some of the issues that could be discussed could be sensitive to the individuals involved and some may be hesitant to openly discuss topics that may reflect badly on them personally. Additionally some participants may be concerned about speaking negatively about their colleagues, managers or the organization that employs them.

Researchers in the field of business and management must be aware of these power relationships and internal organizational politics (Easterby-Smith et al. 2002).

The researcher fully disclosed the nature of the study to all participants, to ensure that all subjects were comfortable with what was involved in the research and participated freely, rather than at the behest of their supervisors (Bryman 2008). Written consent to participate was confirmed with each candidate prior to any interview (Kvale 1996). While it must be noted that there can be no 100% guarantee of confidentiality, all efforts will be made to protect individual identities should they request it (Ritchie and Lewis 2003). Notes and recordings of interviews will be securely stored and will not be labeled in ways that could make individuals readily identifiable.

6.6 Summary

This chapter examines the methodological decisions taken by the researcher in relation to this project. Various research paradigms were discussed in order to explain the methodological decisions taken in relation to this project. The reasons for the selection of specific data collection methods were outlined and an overview of approach to both interviews and analysis of data was explained. The financial network is a complex system where various elements of the system evolve at different rates. The perspectives, experiences and reactions of individuals at different points of this system to the same events can be very different. The financial services sector frequently offers high rewards to risk taking behavior but also faces sporadic extreme events with far reaching consequences. Crisis events can bear many similar traits but, by their very nature, never occur in the same way twice. The research project outlined here is explorative in nature and is aimed at developing a better understanding of the crisis management strategies in a complex and competitive environment. It is hoped that this research can add to previous work relating to crisis management and resilience and be applicable to complex organizations operating outside of the financial industry.

7 Data Analysis

7.1 Introduction

This chapter will provide an overview of the three organizations which are the focus of this research. A brief background and history of each organization is provided to offer some context for how they developed and positioned themselves within the financial markets they operated in. Subsequently a comparative analysis is provided for the behaviour of each organization in the period preceding the Financial Crisis, the markets focused on and the relative risk profiles of each organization. These decisions directly impacted both the ability of the organizations to react to challenging conditions, but also outline the cultural differences between the organizations and how that impacted their behaviour during the Financial Crisis. Finally, a summary is provided of the changes made within the organisations and the industry as a whole in the wake of these events, and an exploration of the attitudes of staff toward these changes and the impact this has on future risk management efforts,

7.2 Background of Organizations

7.2.1 Anglo Irish Bank

Anglo Irish Bank (Anglo) was formed in 1964 and initially the company offered a range of financial services, such as personal loans, car finance and a limited number of commercial mortgages. The banking industry in Ireland was traditionally dominated by the 'big 3', Allied Irish Bank (AIB), Bank of Ireland, and Ulster Bank (Clarke and Hardiman 2012). Anglo was formed in the midst of growing international interest in the Irish market as economic and industrial reforms made it an attractive prospect and over forty new banks were formed in the state between 1960 and 1972 (Carswell 2010). By 1987 Anglo Irish Bank had merged with or acquired a number of organisations, including the City of Dublin Bank and stockbrokers Porter and Irwin and Solomons and Abrahams. While still a minor player in the industry compared with the 'big 3', Anglo had become a more established bank and had developed a niche market of commercial loans and hire purchase agreements for small businesses in Ireland. In 1988 Anglo Irish Bank purchased The Irish Bank of Commerce from Credit Commercial de France. This purchase gave Anglo Irish Bank access to a number of prominent Irish business men from sectors including media, aeronautics and most notably property. From this point Anglo Irish Bank moved away from one-off transactions and adopted the customer relationship model of the Irish Bank of

Commerce. The aim was now to build lasting relationships with larger clients in order to grow the bank's loan book. Offices were opened in the Isle of Man to avail of favourable tax rates and in London to handle the UK based investments of their larger clients (Carswell 2011, Lyons and Carey 2011).

This strategy led to a prolonged period of success for the organisation and their model of customer relationship management and speed of response to loan requests attracted other large commercial accounts, frequently property developers (Anglo Annual Report 2007). In 1987 Anglo Irish Bank was valued at approximately €2 million, by 2000 that valuation had grown to €650 million. By this point the bank were funding investments on behalf of their clients internationally (Carswell, 2010). An office was opened in Chicago in order to expand into the American market where many Irish developers had already begun to invest. The bank continued to post record profits and valuation soared. By 2004 the bank's valuation had reached €6 billion and other Irish banks had begun to adopt the 'Anglo model' (Nyberg 2011). Property prices in Ireland continued to soar as competition increased. Irish property developers expanded overseas, by 2005 nearly 50% of Anglo Irish Bank's Loans originated from offices outside of Ireland (Carswell 2011, Anglo Irish Bank Annual Reports 2004, 2005).

In January 2007 Anglo Irish Bank was named by financial consultants Oliver Wyman as the Best Bank in the World at the World Economic Forum in Davos (Financial Times 2013). In June the company's valuation reached €13 billion. Over a period of seven years Anglo's share price had risen by over 2,000% and profits had increased by 826%. Signs were noticed as early as 2006 that property prices in Ireland were beginning to struggle, and effects of the subprime crash in the United States began to affect global markets. In spite of these warnings Anglo continued to lend money at record rates. Anglo Irish Bank lent an average of €346 million per week in 2007. Anglo were reliant on short term funding to maintain their liquidity requirements and their own continuing lending. The impact of the global downturn began to affect Anglo's ability to borrow money and their share price began to drop (Carswell 2010). By September 2008 Anglo's value had effectively fallen to zero and the Irish government were required to inject €1.5 billion into the bank and took a 75% stake in the company. By mid-2009 the bank had been fully nationalized and had required additional government funds of approximately €4 billion (Carswell 2010, Honohan 2010). By November 2010 the costs associated with saving the bank were deemed untenable and a decision was made to wind down the institution. The total cost of bailing out Anglo Irish Bank has been estimated at between €29 and €34 billion, or 15% of GDP (Carswell 2010, Honohan 2010).

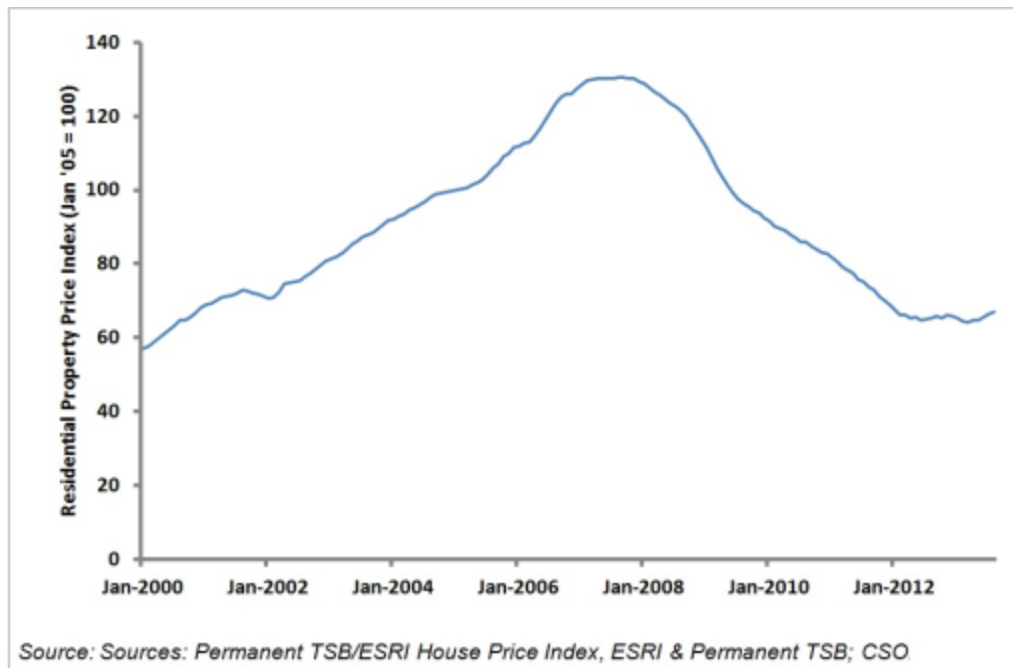


Figure 1: Property prices in Ireland 2000 - 2012

7.2.2 Santander UK

Santander UK is an independent bank operating within the UK. Part of the Santander Group who have their headquarters in Santander, Spain but required by UK financial regulation to be a fully independent and self-sufficient entity. Prior to the financial crisis Santander had a relatively low profile in the UK. With both a retail banking division and an investment arm, Santander Asset Management UK (SAM UK) had grown moderately but consistently since entering the UK market in 2004. The culture of the UK organisation was heavily influenced by the attitude of the parent company in Spain. Regulation by the Central Bank of Spain is more stringent than that of the Bank of England and as a result Santander UK were considerably more conservative than many of their UK competitors. Internal regulations required considerably higher buffers for capital to protect the organisation from unanticipated events (interview 1, interview 2).

SAM UK had little to no exposure to leveraged funds or to derivatives as 'we weren't playing in that game' (interview 1). In addition to lower exposure they also had relatively larger cash reserves than many of their competitors. Financially this has a negative impact in good years as it impacts the ability of the core business to make profits. However, when the market turned the exposure was lower and the available cash buffer was larger which protected SAM UK, and Santander as a whole from the harsher elements of the Financial Crisis (interview 1).

As a result of these internal structures and requirements Santander were not just well insulated to the events of financial crisis, but were actually in a position to benefit from it. SAM UK had sufficient cash reserves to allow them to transfer many of their illiquid assets onto their own books and wait out the crisis, removing much of the impacts from their customers and limiting reputational damage (interview 2). They were also sufficiently solvent to purchase some institutions who were unlikely to survive the effects of the Financial Crisis. As a result of purchasing Bradford and Bingley and Alliance and Leicester Santander UK were able to dramatically increase their customer base as well as grow their branch network, becoming the 3rd biggest bank in UK (www.santander.co.uk)

In contrast Anglo's business model was focused almost entirely on customer relationships. In order to maintain these relationships they were eager to facilitate projects for many of their customers and prided themselves on quicker responses and more flexible terms than many of their competitors. Initially this proved to be an extremely successful business model, allowing the company to grow from a valuation of EUR2m in 1987, to EUR650 million in 2000 and EUR6 billion by 2004. The prolonged period of extreme success began to undermine risk management efforts within the organisation. As time passed Anglo became gained a reputation in both UK and US markets for financing people and projects that no other institutions would even consider. The recklessness continued despite increasingly challenging market conditions. In 2007, Anglo lent an average of EUR346 million per week (Carswell 2010).

Anglo had an internal rule to limit their property exposures to 15% of their total loan book (Carswell 2010). Internal discussion within Anglo acknowledged the need to diversify and according to Sean Fitzpatrick a decision was made around 2005/2006 to stop development lending and explore new markets to continue growth. An important concession was made with regard to this new strategy, existing customers with "a good track record" would continue to be supported (Lyons and Carey 2010, p. 252). By 2008 25% of Anglo loans were directly linked to property (Carswell 2010).

An interview with a government appointment to the board of Anglo after the bank was bailed out, discussed the role of the Board of Directors during this period. Noting the lack of direct banking experience by many of the board members, the number of board members with substantial property interests, and in some cases large loans with the bank, and the personal friendships with senior management within the organisation, he stated:

“I don’t think that there were enough people on the board who would keep up with that kind of thing... And I think there weren’t enough people on the board who took it or who gave the time to challenge things. And the fact that there were people on the board who were involved with substantial borrowers of the bank was a bad mistake. I don’t think they challenged enough what the bank was doing.”

Clarifying his statement the interviewee further noted that there a number of an internal rules regarding lending policies and exposures to specific industries. By 2007 Anglo had blown through just about all of these internal limits. In fact, ‘aggregate exposures to the top 20 customers (individuals and related entities) as at May 31st 2008 equated to circa 50% of the Irish loan book of \$41.7bn’ (Nyberg 2010, p. 32).

7.2.3 RBS

Founded in 1727 in Edinburgh, Royal Bank of Scotland (RBS) was one of the pioneers of many modern banking practices such as branch networks, overdraft facilities and public share offerings. For the first 200 years of its existence it grew slowly, contributing to the reputation of Scotland as a nation of canny bankers, and had achieved a prominent position within British banking. International expansion began in the 1960s with offices opening in initially in New York and then other major US cities and in Hong Kong. In 1986 the ‘big bang’ resulted in massive deregulation within the City of London. Royal Bank of Scotland were in danger of being left behind. In 1987 George Mathewson was appointed director of strategic planning and development. Mathewson quickly realised that the institution was in trouble as they were struggling to derive a profit from their established businesses. By 1990 along with a select number of senior managers and directors developed a plan for a management clear out and a restructuring of the organisation. November 1990 saw the departure of almost twenty five per cent of senior managers and the installation of Sir George Younger as Chairman and George Mathewson as Chief Executive.

This new management team restructured the day to day operations of the business. The branch network was overhauled with much of the functions previously undertaken by branch managers centralised in Edinburgh. Excess cash holdings in branches were also held centrally so the funds could be put to use in commercial lending. A new modern IT system was installed to increase overall efficiency. The reputation for conservatism was replaced with one for dynamism as a sales culture developed within the Royal Bank. These changes resulted in profits growing from

£256m in 1993 to £801m in 1997. It was around this time that George Younger was making plans to retire and George Mathewson began looking for his replacement.

In 1998 Fred Goodwin was appointed as Finance Director and Deputy Chief Executive of the Royal Bank of Scotland. Mathewson had a goal to turn to Royal Bank of Scotland in the 'best bank in the world' (Martin 2013, p. 91) and was also wary that if they remained a small bank on the international stage they were vulnerable to a takeover. His appointment of Goodwin as his successor was made with this goal / concern in mind. In early 2000 the Royal Bank of Scotland successfully took over NatWest beating Bank of Scotland in the process. This purchase dramatically increased the size of the bank by approximately 200 per cent and provided a vast network of over 2300 branches throughout the UK. After the success of this bid Younger retired as Chairman, Mathewson stepped down as Chief Executive and in January 2001 Fred Goodwin officially took over the role.

Between 2001 and 2007 RBS expanded rapidly with takeovers of businesses from a variety of industries. Aviation Management, a company which specialised in leasing aeroplanes, was purchased in 2001. Dixon Motors a chain of car dealerships was acquired in 2002. Churchill, an insurance company was purchased in 2003 for a sum of £1.1bn. 2005 saw the bank take a 10 per cent share in the Bank of China. Ulster Bank, a subsidiary of the Royal Bank of Scotland purchased First Active Building Society in the Republic of Ireland to take advantage of the ongoing property boom. Citizens Bank in the US also began acquiring smaller organisations with Community Bancorp (2003) and Roxborough Manayunk Bank (2004).

In tandem with this expansion the Royal Bank rebranded itself as RBS in 2003, a simpler name that would help with international development of the brand. Additionally RBS began to dramatically increase its public relations activities, notably in relation to sport sponsorship. They undertook prominent sponsorship arrangements in relation to golf, rugby, tennis and formula 1. Jack Nicklaus and Jackie Stewart were both hired as brand ambassadors on contracts of £1 million per annum. Overall RBS were spending approximately £200 million per annum on sports sponsorship activities. Profits continued to rise during this period. In 1992 the bank had posted a pre-tax profit of £21 million, 10 years later that figure was £4.4 billion. By 2005 both Goodwin and Mathewson had been knighted for their services to banking, RBS had moved to a new £350 million headquarters near Edinburgh airport and profits of £5.2 billion were reported for the group, an increase of 24% from the previous year.

7.3 Events Prior to Financial Crisis / Crisis of Management

The crisis of management phase is where initiating and contributory events first develop (Bea 2001). A crisis event can be avoided at this point, but in a tightly coupled system these weak signals may be missed or their importance not recognised and they can be allowed to incubate within the system (Turner 1977, 1979). Both Anglo and RBS focused on very aggressive market expansion strategies in the years prior to the Financial Crisis. Annual figures reported record growth and profits, and continued to forecast positive forecasts for coming years despite growing pessimism from economic forecasters (Kelly 2010, Nyberg 2011, Martin 2013). RBS had a minimal international presence since the 1960s but their acquisition of NatWest in 1999 immediately made them the second largest bank in the UK and began a period of rapid expansion. Further acquisitions followed, including a 10% stake in Bank of China in 2005 and, as part of consortium with Banco Santander and Fortis, the acquisition of ABN AMRO in 2007. Expansion of commercial lending and asset management led to record growth (FSA 2011). Early warnings of future chaotic conditions were missed and weaknesses continued to build up with the organisation.

Anglo pioneered the relationship banking in Ireland and its initial success and rapid growth resulted in the institution become widely admired both in Ireland and abroad. The speed with which they responded to requests, combined with the flexible approach they took with large clients resulted in strong loyalty from these customers, many of whom were property developers (Lyons and Carey 2011). Simon Kelly, an Irish property developer, outlined his dealings with Anglo in relation to a commercial property development in 1994. 'Anglo were the only bank in town willing to finance speculative development for us... they were the only show in town. It would be years before I even went to another bank about a deal (Kelly 2010, p. 19). Anglo's flexibility with their clients allowed for development to happen at a time when credit was difficult to source in Ireland. Their success contributed to a gradual lowering of credit standards by other institutions which was one of the prime factors for prolonging the property boom in the country (Nyberg, 2011). This approach to managing client relationships reached its nadir in June 2007 when Derek Quinlan, in what was then the largest property deal in Irish history, won an auction to purchase the Jury's Inn chain of hotels in Ireland and the UK with a bid of €1.165bn. A senior Anglo executive reportedly arrived to the venue of the auction at 1.00am with a cheque for €1.165bn to allow the deal to be completed (Carswell 2011).

Anglo were achieving continued and growing success, and the strategy was seemingly approved of by the regulatory authorities. They were viewed as a highly profitable company and other financial institutions began to chase similar levels of profitability, many began copying and directly competing with Anglo and in some cases actively head hunting Anglo staff to replicate the same models. These institutions exposed themselves to the same risks as Anglo (Nyberg 2011). Reports into the events surrounding the crisis were united in their views that despite other institutions copying their strategy, Anglo were the most reckless in this market approach (Nyberg 2011, Honohan, 2012). The strategy and organisational traits which provided a competitive advantage in a booming market were also the same attributes which allowed risk to incubate within the organisation and reduce resilience to the forthcoming transition to a chaotic environment. There was a risk management department in place but it was heavily influenced by the overall corporate expectation of continued growth (Interview 6)

Sean FitzPatrick was Anglo CEO from 1988 until 2004. When he stepped down a committee was put in place to determine his successor. A number of senior executives were in the frame, but the appointment of David Drumm was a surprise both internally and externally (Carswell 2011). Drumm had previously established and grown Anglo's North American operations. The succession of Drumm and subsequent escalation of FitzPatrick to the position of Chairman seemed to underline the strategy for rapid growth and limit the potential for senior management to be challenged. The Board of Directors were predominantly made up of people close to either Sean FitzPatrick or David Drumm. Most of these members lacked the relevant backgrounds or expertise to monitor the complexities of risk exposures of an increasingly large and international financial institution. Many members of the board also owned significant amounts of Anglo shares suggesting their belief in the company strategy and the ability of the senior management team. In 2007 the position of Chief Risk Officer was combined with the Finance Director. This coincided with a large increase in property related lending in the UK and the US, demonstrating the further marginalisation of risk management within the bank (Nyberg 2011). Subsequent to Drumm's appointment a number of senior executives overlooked for the role left Anglo removing a breadth of institutional knowledge from the organisation (Carswell 2011).

RBS was a considerably larger organisation than Anglo, and had a number of experienced executives in both operational roles and on their Board of Directors. However, extended growth under the stewardship of Fred Goodwin had reduced the scrutiny placed on his decision making (FSA 2011). The acquisition of ABN Amro was pushed through under the impetus of Goodwin's

leadership despite a number of people both internally and externally noting concerns about risk profile of ABN Amro's loan book and how it would actually increase the concentration of risk within RBS' investments (Martin 2013). Goodwin was said to be focused on growing RBS to being the largest bank in the world, and by some metrics did achieve this for a few months in early 2007. As a result of this focus many people have stated that he neither focused on the operations within the investment arm of the company, nor fully understood the nature of that business. His focus was more on the marketing and public relations aspects of the company than the

Conversely, Santander had a more established management structure within both the UK organisation, but also within the wider Santander Group. A detailed reporting structure ran between fund managers, the risk department and CEO of SAM UK. Additionally, the risk department and CEO of SAM UK reported directly to senior management of Santander UK and to their counterparts within the global group. With strict rules and reporting practices in place there was no evidence of cult of personality as seen in both Anglo and RBS. In interviews with Santander employees and wider reading about the organisation there was no reference to power plays or factions within the group (Interviews). Santander were of a considerably large scale than Anglo Irish Bank, but RBS was a larger organisation within the UK and of a similar scale globally and there were numerous references to an aggressive culture defined by Fred Goodwin and evident throughout the operations of the business (Haldane 2011, FSA 2011, Martin 2013). Risk management culture was marginalised in both Anglo and RBS, while interview candidates from Santander did variously refer to the risk management processes and people as "very stringent", "conservative", and in one case as 'incredibly risk averse', there was a clear acknowledgement by each person that risk profile of the organisation and the people working within that structure created the conditions for Santander to be not just stable during the Financial Crisis, but to actually prosper as other banks faltered (interview candidates 1,3 and 4, Haldane, 2011).

As discussed in Chapter 2, there were many contributing factors to the Financial Crises, including misaligned incentives and an over-reliance on complex products and risk management tools. However, overall the market suffered from a collective belief that the problem of risk had been solved. Individual organisations had evolved to a point where they felt they could manage their own risks. In many cases banks were not actively adjusting to changing environments - Anglo acknowledged a need to diversify investments and move away from focus on property, except for established clients or 'friends of the bank'. (Honohan 2010, Nyberg

2011) These customers continued to conduct large property deals financed by Anglo and secured against the properties themselves, exacerbating the risk exposure. RBS continued their expansion plans with the acquisition of ABN Amro despite the fact this deal would double their loan book, and again concentrate their risk in a narrow product range (Haldane 2009, Martin 2013). As the dominant set of conditions that these organisations were operating in changed the resilience within Santander UK and decision making structure in place allowed them not only to weather the storm, but to actually benefit from the strains placed on the wider market.

7.4 Response During The Financial Crisis / Operational Crisis

The operational phase is concerned with the acute stage of the crisis, when an evolving situation creates task demands which exceed the abilities of the organisation (Smith 2005, Light 2012). As the Financial Crisis unfolded each organisation faced different challenges, risks which were allowed to incubate emerge to cascade through vulnerable pathways and gaps in defence (Reason 1990). The SAM UK CEO agreed that they outperformed the market but admits that 'it's partly because we started in a better position' (Interview 1). As discussed above, by virtue of a more conservative approach and more stringent internal risk practices Santander had more cash on hand and much stronger liquidity buffers than many of their competitors. This allowed them to focus on commercial concerns other than survival, and make more deliberate decisions than many of their competitors.

SAM UK CEO mentions reputation a number of times during the interview. SAM UK were continually concerned about reputational impact of the Financial Crisis and undertook a number of decisions to limit any potential reputational damage. Traders unwound risky positions and investments to avoid having to repeatedly tell customers they were losing money. SAM UK investments and cash reserves were used to move illiquid assets from customer funds onto the bank's balance sheet and replace them with liquid assets. The goal of this action was to maintain consumer confidence and avoid having to sell illiquid assets in a fire sale. SAM UK cash reserves were used to cushion the organization from both the financial and the reputational implications associated with the Financial Crisis.

However, a division of SAM UK, Optimal, which operated with more freedom and a higher risk profile than other parts of the organisation was heavily invested in funds managed by Bernie

Madoff. Bernie Madoff ran investment funds which at one point were valued at \$17bn, Madoff was actually defrauding his clients and this became known in Dec 2007, 3 months after Lehman Brothers collapsed (www.economist.com). Exposure to these funds resulted in a loss of almost EUR3bn and severe reputational damage for Optimal and SAM UK. SAM UK's current Chief Investment Strategist was managing the Optimal investment funds at the time. Describing the events and the response he stated:

“It was basically crisis management from all sides. Because of the reputational damage that occurred we were in press almost on a daily basis... Financial Times, Wall Street Journal etc..... On a human level clearly people were in disarray but the bank was very fast in getting a couple of solutions”

Referencing the strong position Santander were in he outlined the steps taken by Santander to resolve the issue quickly and minimise the reputational damage associated with the events:

- The CEO of the bank agreed to repay all clients for any losses suffered
- The Optimal brand was closed and remaining funds were brought back under the remit of SAM UK
- SAM UK were the first group to settle with the Madoff estate, meaning SAM UK were freed from any future potential liabilities associated with scandal

A clear understanding of their exposure, combined with a defined internal communication process and strong liquidity buffer allowed SAM UK to make very swift decisions to limit both the financial exposures faced by them and their clients, and the reputational damage they could have easily faced. Complex risk management metrics were repeated across the industry so many banks had developed similar systems of control, with similar responses planned of selling assets in strained conditions. However, in a systemic event where liquidity disappeared from the market these risk management strategies proved unsuited to the environment (Turner 2009, Wray 2007, 2008). SAM UK were not forced into panic selling due to these buffers. Anglo and RBS were unable to respond in a similar manner as events began to spiral out of their control.

Cracks began to appear in the Irish economy from 2007. In the UK, Northern Rock required a government rescue and soon after Bank Paribas posted large losses. Government officials in Ireland maintained that the fundamentals in the Irish economy were strong and financial regulators and institutions maintained they were sufficiently capitalised to withstand any losses

(Morris 2010). In March 2008, following JPMorgan's buyout of Bear Stearns the problems in the Irish banks became harder to ignore. Anglo lost 50% of its share value on what became known as the St Patrick's Day Massacre (Lyons and Carey 2010, Irish Times 2014). Internally it had become apparent that the bank was facing serious problems. Additionally the Anglo model was dependent on short term financing and the liquidity in this market was disappearing as financial institutions realised that many organisations were unsure of their own levels of exposure. The market was particularly concerned about Anglo so raising funds was becoming almost impossible and threatening their ability to maintain operations (Nyberg 2011, Regling and Watson 2010).

The reputation developed by both Anglo and RBS in the years prior to the Financial Crisis was centred on being an aggressive lender making large deals and large profits (Carswell 2011, Martin, 2013). The projects they financed and their investment portfolio created a circumstance where both institutions were vulnerable to the effects of the Financial Crisis. With property prices crashing internationally, and even more dramatically in Ireland, assets supporting these bank's lending were heavily undermined. Anglo's funding model was dependent on short term funding which began to disappear from the market as liquidity dried up. Against the backdrop of growing international financial instability and dramatic drop in national property prices the two core issues faced by Anglo was managing their collapsing share price and seeking short term liquidity in an increasingly uncertain market (Nyberg 2011). RBS faced almost identical concerns at the height of the crisis with share price plummeting and at one point concerns that they would not be able to continue operating to the end of the day (Martin 2013) In stark contrast, SAM UK were able to systematically review operations, utilize their large buffer of funds and strategically acquire struggling competitors, demonstrating the resilience developed within their organisation by retaining their more conservative levels of risk management during the boom, despite pressure from customers and staff alike (Interviews 2 and 3).

Similarly, RBS were over leveraged and dependent on short term financing to continue operations. As markets seized RBS struggled to maintain liquidity. Steven Hester, who took over as CEO after Fred Goodwin stepped down, summarised the core strategic errors made within the organisation:

'We financed ourselves in an unstable way, we were too leveraged, the strategy wasn't clearly focused on the things we were actually good at, risk controls were

poor, management processes were a bit dysfunctional and we were driven too much by profit expansion without thinking about the inputs' (Martin, 2013 p. 296)

As discussed above, the corporate culture in Anglo was to source innovative solutions for their customers, and to aggressively grow their businesses often by making deals other banks balked at. The response to the issues faced in this time matched rule bending culture. During this period, other Irish financial institutions were also experiencing difficulty accessing funds through international markets (Kelly 2010). Pat Neary, CEO of the Financial Regulator, arranged a series of meetings with senior representatives of these banks in March 2008 (Carswell 2008). The discussion focused on the weakness of the Irish banking system and how the Irish banks needed to 'circle the wagons' to support each other. It was suggested that the smaller banks specifically needed to cooperate with each other as in a liquidity crisis they would be the first to fall. This inter-bank mutual support policy suggested by the regulator was referred to as the 'Green jersey agenda'. There was no specific direction given in relation to this agenda, allowing the banks to innovate as they saw fit.

Prior to the publication of Anglo's half - yearly results a circular transaction with another institution Irish Life and Permanent (ILandP) was created in order to make their deposit figures appear stronger than they were. Anglo lodged an amount of €750 million with ILandP as an inter-bank deposit. Irish Life Assurance, a pension company owned by ILandP then deposited €750 million with Anglo which made its corporate deposits figure appear stronger than it was. This transaction was approved at senior level within both ILandP and Anglo. An internal email between the ILandP finance director and the head of Irish Life Assurance, seen by Simon Carswell stated that this transaction was 'encouraged' by the Central Bank, but the details of it should kept 'tight to senior management' (Carswell 2010, p. 203). The arrangement was reciprocated in June 2008 when Anglo temporarily lent €3.3 billion to ILandP so their borrowings from the ECB could appear lower than they were (Nyberg 2011).

Events within Anglo during September 2008 showed the unstructured and in many cases uninformed nature of decision making at senior levels in the institution. On September 18th CEO David Drumm presented figures to the Department of Finance that Anglo was fully funded, did not require external help, and predicting profits of €1.4 billion in 2008 and €1.1 billion in 2009, these figures included write offs of approximately €400m for bad debts. The bank firmly believed it remained solvent and was only facing a liquidity problem (Carswell 2010). The day prior to this Drumm had met with IFSRA and explained how Anglo were losing deposits at a rate

of \$1 billion per day and would soon be in breach of liquidity ratios unless emergency funding was provided to them. Drumm requested \$7 billion in emergency funding in advance of Anglo's year end results (Lyons and Carey 2010, Honohan 2010). However, in 2013 tapes of phone conversations between Anglo employees were released by the Irish Independent newspaper. These conversations detailed how the senior management of Anglo were aware that the losses they faced were far in excess of what they admitted to the regulator and the central bank on September 17th 2008. A conversation between John Bowe, the Acting Director of Treasury and Director of Capital Markets, with Peter Fitzgerald, then Director of Retail Banking, on Sept 18th discussed that meeting and Anglo's request for funding (www.independent.ie):

PF: How did you arrive at the seven (billion)?

JB: Just, as Drummer would say, picked it out of my arse, you know. Em... I mean, look, what we did was we basically said: what is the amount we can securitise over the next six months? And basically say to them: Look, our problem is time, it's not our ability to create liquidity, the enemy is time here.

PF: Yeah.

JB: So we can rebuild in other words, we can rebuild the liquidity off our loan book, but what we can't do is, we can't do it now and the balance sheet is leaking now.

PF: Yeah, yeah, unless the balance sheet stabilises, then you can't buy some time.

JB: And that number is seven. But the reality is that actually we need more than that. But you know the strategy here is you pull them in, you get them to write a big cheque and they have to keep, they have to support their money, you know?

PF: Yeah, yeah, yeah, yeah, yeah. They have to have skin in the game and that's key.

JB: They have and they have invested a lot. If they saw the enormity of it upfront they might decide, they might decide they have a choice. You know what I mean? They might say the cost to the tax payer is too high. But em ... if it doesn't look too big at the outset... if it looks big, big enough to be important but not too big that it kind of spoils everything.

PF: Yeah, yeah

JB: Then, then I think you have a chance. So I think it can kind of creep up.

PF: Yeah, yeah, yeah. They'll give you a bit of a drip.

Another conversation on September 19th between David Drumm and John Bowe outlined how the banks sole focus at that was to source funding from the government. This discussion was in advance of another meeting with the Central Bank and Department of Finance and Drum and Bowe were planning their approach to the meeting:

DD: No, well, we've already talked about the loans, what do we need to think about? We need the fucking loans because we are running out of money. We gave you the term sheet. Can we have the money? Do ya know? Just keep it simple.

JB: Yeah I know, I don't know how simple its going to be though.

DD: It'll be stupid simple 'cause that's where I'm going to take it. I'm going to keep asking the same question: When? When is the cheque arriving?

....

DD: Get into the fucking simple speak: We need the moolah, you have it, so you're going to give it to us and when would that be? We'll start there. And by the way, the game has changed because really the problem is at their door now.

JB: It is yeah, yeah

DD: Because if they don't, don't give it to us on Monday they have a bank collapse potentially. If the fucking money keeps running out the door the way it has been running out the door.

The other main area of concern was the stake quietly built up by Sean Quinn in Anglo. In 2007 the board discovered Sean Quinn has a stake of over 24% in Anglo Irish Bank, which he increased over subsequent months to between 28 and 29% (Carswell 2010). As the impact of the international financial crisis spread to Irish banks through 2007 and 2008, Anglo's share price began to fall. Quinn's own business was under pressure and began to struggle to meet the 'margin calls' as his investments fell due (Lyons and Carey 2011). The Anglo board were concerned about the impact of the market flooding with Quinn's shares would have on their already falling share price (Carswell 2010, Irish Times 2014). Initially Anglo extended credit to

Quinn to meet the payments as they fell due but they were also looking for a longer term solution to the Quinn problem. Potential investors were sought from Europe and the Middle East by Anglo's senior management. Falling share price and increased rumours of the stability of the organisation meant these approaches were unsuccessful and other options were investigated. (Carswell 2010).

Anglo approached ten high net worth individuals, many of whom were considered 'friends of the bank' and offer them the chance to buy 1% of the bank. The approach included an offer of a pre-approved loan of €45 million to fund the share purchase. The loans were secured against the shares themselves and only have a 25% recourse provision included in the terms. Later, after the share price has truly bottomed out, a letter is added to the files of each of these clients removing even the 25% recourse. These letters are later removed when an objection is raised by the financial regulator. A further €169 million was lent to Sean Quinn's wife and children to purchase the remainder of his shares (Irish Independent 2014, Irish Times 2014, Carswell 2010, Lyons and Carey 2011).

As falling share prices and vanishing liquidity became a more pressing concern Anglo engaged in a variety of practices that were at best unethical, and in some cases potentially illegal, in order to maintain their position. The funding arrangement with ILandP was intentionally designed to misrepresent the true position the bank was in. When further efforts were required senior management within Anglo intentionally misrepresented facts to the regulators, the Central Bank and the Irish government in order to gain access to public funds. The taped conversations outline how the bank provided false information and then backed to government into a corner forcing them to bail out Anglo and then continuing supporting the bank as the funding gap would continue to grow (Honohan 2010, Carswell 2010, Nyberg 2011). The Anglo 10 solution to the Sean Quinn problem was involved lending the bank's money to purchase its own shares, which was specifically barred by Irish bank regulations (Honohan 2010, Nyberg 2011).

Some researchers noted that in crisis conditions rigid structures may inhibit the ability of an organisation to respond and allow the consequence of emergent events to be exacerbated (Fischbacher-Smith and Fischbacher-Smith 2009). While Santander had built up a greater resilience to this particular market crisis, they also had a clearer understanding of their financial exposures and a defined communication and decision making process in place. Anglo and RBS had a more aggressive viewpoint and decisions frequently were dictated from a central point, both organisations struggled to clearly understand their exposures, to communicate

clearly between various departments, and to respond in a systematic manner to the unfolding crisis. Interviews with SAM UK employees noted a very busy time during the height of the Financial Crisis but gave no impression of panic or ad hoc procedural changes in order to react to environmental changes.

7.5 Operational Adjustments Post-Crisis / Crisis of Legitimation

The legitimization phase is the process of turnaround and organisational learning following the actual crisis event itself (Smith 1995). During this period the financial industry and individual organisations began to assess how these events had come about, what could be learned and how a future reoccurrence could be avoided. In order to continue operating RBS received an initial bailout of £20bn from the British government, which subsequently raised to over £45bn and with it made a number of enforced management changes. Fred Goodwin was forced to step down from his position as CEO and was replaced by Steven Hester. The Chairman of the Board, Alasdair McKillop also stepped down within months along with many of the previous board, who had approved the ABN Amro acquisition now viewed as the most reckless acquisition made by the bank. RBS began unwinding a number of acquisitions it had made in recent years, writing down bad loans and putting a stricter risk management structure in place. With the government taking a 76% stake in overall ownership of the company it was tasked with heavily reducing risk within the organisation, but also generating profits to pay back the funds lent by the government and return to private ownership (Martin 2013, FSA 2011).

RBS required the largest bailout of any UK bank and they and Fred Goodwin were widely covered in the press and held up as examples of the worst excesses of the financial industry. With the UK government owning a significant stake in the company and the level of press attention Stephen Hester was under increased pressure to turn performance around, but also to limit the excesses of the industry. There was ongoing public pressure for Hester not to be paid bonuses during his time in the role, and to limit payment of bonuses to RBS staff (Tett 2011, Martin 2013, Haldane 2011). Other financial institutions were able to return more standard operations but RBS continued to face a higher level of public scrutiny and needed to manage public relations concerns in addition to financial issues.

There was ongoing debate about the financial viability of Anglo and various paths forward were suggested, including splitting the organisation into a 'good bank' and a 'bad bank', writing down a large portion of the loan book, and merging with another Irish bank. During this period of review the bank continued to operate and a period of staff re-education was undertaken by new management team to convert staff to being "getters back of money, rather than lenders. And it was a major job to change that mind-set" (Interview 6). The board produced a business plan in May of 2010 for continued operation, but this was rejected by the Irish government and Central Bank and a plan was put in place to wind up operations of Anglo Irish Bank by 2018 (Carwell 2010, Honohan 2010, Interview 6).

Wider changes in the industry attempted to tighten regulation, bring stability to the market and to limit the chances of creating another Financial Crisis (Haldane 2011). An interview with a senior government official in the treasury at the time explained acknowledged how perilous conditions became at the height of the crisis: "People came very close to panicking during fuel strike, foot and mouth and even Northern Rock, and they were relatively minor in comparison. If the entire banking system shut down, you can't get money to buy food, or petrol. You would have not just an economic problem, but a very profound problem of social unrest" (Interview candidate 5). The concerns by various stakeholders from the general public to politicians through to industry regulators impacted the focus of many of the changes made at this point.

Learning is a continual process of detecting and correcting errors (Argyris 1977). Many changes made, both within individual organisations and in terms of industry regulation, were focused on the events of this Financial Crisis. Responses by people in the industry has been mixed. Interviewee 1 noted that "people are much more cautious in the way in which they have to operate, and (have) a recognition that the regulatory constraints are much tighter, and the capital constraints on the bank are so much higher that in some ways the pendulum seems to have swung". He further noted that the portion of employees working in risk and reliance within the organisation had increased from three to five per cent to closer to fifteen to twenty per cent, and that a much higher proportion of his time is spent considering risk and reporting requirements (Interview 1). AD, the government appointee to Anglo Board outlined the regulatory changes in Ireland after the Financial Crisis. The budget for the regulator had increased and considerably more positions had been created, however this created its own problems as the surge in positions was making it very difficult to find suitably qualified and capable candidates for the roles (Interview 6). Another SAM UK interviewee strongly felt there was both an over correction in regulation, and a focus in the wrong areas:

“Regulation will always lag practice. Until you actually change the rules of the game regulation will not avert the next crisis. Why? Because it never has in the past. Regulation by definition is fighting the last war. Is there push back (by staff)? Not really, because there’s no point. Is there conscious attempts to find new ways to do business and make money that either isn’t captured or is allowed within the current framework if you take a certain definition of what it’s there for? Yeah, of course. The financial system is an incredibly complex system. It is an adaptive open system, and it will evolve. To the extent that regulation is not just about the letters, it’s the principle behind it that’s important now. Does that address the issues? Not really. Bankers are no different to lab rats or traffic wardens or anything else in the sense that if you incentivise them correctly they will behave the way you want them to. So the focus needs to be on the incentivisation structure, not on saying what people can and can’t do’ (Interview 3).

8 Conclusion

This research focused on the experiences of three separate organisations who have very different experiences during the Financial Crisis. Santander UK clearly thrived during this period as they had a more conservative investment strategy and held a considerably higher liquidity buffer. As a result of these strategic choices they were able to make many decisions without concern for the immediate viability of their business. Anglo were a smaller organisation who had grown exponentially with a specific high risk business model. A combination of extended success and risks associated with their business model of short term financing left them exposed when liquidity vanished from the market. RBS similarly faced liquidity issues having expanded their business through a variety of acquisitions and market expansion which had left them with a heavily concentrated risk exposure.

Due to the large buffers built up by Santander they had sufficient liquidity in house that did not require them to panic sell assets in a falling market. They were in a position to move those illiquid assets onto their own balance sheet until stability returned to the market reducing the financial risk at the height of the crisis. This further allowed them to focus their responses on maintaining and improving their reputation to the general public and the wider industry. Additionally, they were in a position to capitalise on the struggles of other institutions and acquired Bradford and Bingley and Alliance and Leicester in quick succession, dramatically increasing their customer numbers and branch network, making them one of the three largest banks in the UK almost overnight.

Neither Anglo nor RBS retained the financial buffers the Santander had, this limited their options in responding to unfolding events. Both required extensive bailouts by their respective governments to avoid a collapse and neither were able to manage the reputational fall out. Both organisations and their most visible leaders - Fred Goodwin from RBS and Sean Fitzpatrick and David Drumm from Anglo - became the defacto faces of the Financial Crisis in their respective countries. Anglo were not deemed salvageable by the Irish government and there was no public appetite to commit more resources to saving the “worst bank in the world” (Lyons and Carey 2011, Carswell 2011). RBS was too large and of too much systemic importance to be allowed to fail, requiring the government to take a 76% stake in the company and appoint a new leadership team. There was extensive public pressure to limit bonuses to RBS staff and for the government to extract a return on its investment (Martin 2013).

The Financial Crisis was notable for its severity, the global breadth and depths of its impact. In hindsight the fact that it happened was not particularly surprising. Caprio and Klingebiel (1999) identified 93 separate systemic financial crises in the 1980s and 1990s. Black Tuesday in 1987, the Savings and Loan scandal in 1991, the 1997 Asian financial crisis, Russia's default in 1998, the Dot.com bubble in 2002 are a small sample of market events which had knock-on effects. (Reinhart and Rogoff, 2009). The severity of the Financial Crisis was on a similar scale to the crash of 1929 and the subsequent Great Depression. There were widespread calls to increase regulation and change the structure of the financial industry in order to limit the chances of these events repeating. Many large banks and financial institutions enjoyed a long period of enormous profitability, yet when the industry succumbed to a crisis governments were forced to step in and use public money to rescue these institutions (Tregenna 2009). Financial stability should be looked on as a public good (Large 2004). The financial markets need to be forced to play a more limited, more productive and less dangerous role in the economy (Crotty 2009). Haldane (2009) views this period as an opportunity to reframe the industry and the approaches to risk management.

Efforts have been made in individual jurisdictions with legislation brought in in the US, UK and EU designed to reduce the risk of a reoccurrence of these events. However, some have raised concern that lessons have not been learned from these events, and that in the United States in particular the individuals tasked with managing the recovery and regulation of the financial sector are people who 'do not believe in strong regulation and have spent their entire careers opposing it' (Crotty, 2009, p. 578). As the industry and wider economy continues to recover from these events a number of banks have merged and consolidated creating larger organisations, increasing the concentration of risk potentially allow similar pathogens to develop and incubate within the system, awaiting a future trigger (Tregenna 2009).

'Some crises are inevitable no matter how well prepared an organisation is' (Mitroff, 1994, p. 101). Turner (1976, 1978) discussed how crises can 'incubate' within an organisation, unnoticed by management and awaiting an event to trigger a crisis event. This potential for disaster may even form part of the accepted norms within an organisation and impact on the approaches to decision making, reducing resilience to shock events and remaining unnoticed until after a crisis event. Reason (1990, 1997) built on this idea describing a similarly unnoticed error potential he termed 'resident pathogens'. An event, or series of events, uncover these pathogens which move through gaps in the organisational defences resulting in potentially catastrophic consequences. Within this discussion Reason distinguishes between 'active' and 'latent'

failures. Active errors are easier to determine and understand usually occurring at a point of interaction between a human and some aspect of the larger system. Latent errors are embedded within the system, harder to identify and manage and can lie dormant awaiting a trigger event.

Minsky (1992) describes these events as an inevitable part of a cycle that financial markets experience where stability in markets leads to a self-fuelling increase in confidence that inevitably leads to over-confidence and creates instability in the market. Similarly Haldane (2011) references evolutionary adaptation in discussing the financial markets in a similar vein to Kauffman's (1996) theory of Fitness Landscapes, agents will adapt to changing environments and will compete to be the most fit or most adapted to the environment. These actions will directly impact the make of the landscape itself and eventually the skills needed to be adaptive will change. Additionally, a frequent message from the individuals interviewed as part of this research was that another financial crash is inevitable, as the industry is too complex to be safely regulated and personal incentives within the industry continue to encourage reckless behaviour. With that in mind, what can be learned from these events to avoid a repeat of these events, or at least to limit the impact of such an event?

By viewing the industry as a complex system and taking the Fitness Landscape as metaphor for evolution within the industry and attempt can be made to understand the broader nature of events in this system. In ecological systems complexity can refer to the fact there are many organisms interacting who have a complex inter-dependency. These systems can evolve through external impacts, a change in weather conditions, arrival of a new predator etc. This can upset the ecosystem and provide more / less fuel / food for particular organisms allowing them to take a greater prominence and create unanticipated knock on effects (Kauffman, 1996). In human systems, the financial system in particular, internal agents are constantly impacting the system. While there is always direct competition for resources some individuals attempt to disrupt the system. Either through fair means (developing new products - derivatives, MBS etc.) or foul (LIBOR manipulation) (Tett 2010, Wray 2013). Other attempts are made to impact the entire system, for example lobbying for deregulation.

The belief in the ability of individuals to control the environment arguably adds to the inherent instability of the complex system. The actors involved in the financial system - regulators, politicians, ratings agencies, risk manager, individual bankers - believe they could, and in fact were 'managing' the system. This left them even more exposed to the sudden change in

circumstances as their illusion of control resulted in them struggling to adapt to changed environmental conditions. Views expressed by both regulators and individual organisations that ‘the era of boom and bust was over’ and new complex products and risk management tools had managed risk out of the system providing a platform for continued growth and prosperity for all led to a false sense of security within the industry. It further allowed the industry itself to grow more interconnected both internationally and to become of systemic importance to the wider economy. As a result of this, when things went wrong the impacts were much more severe than in previous crises (Sorkin 2010, Wray 2009, 2010, Haldane 2010).

As discussed in the literature review, Organisation Learning often takes place in the wake of crisis events (Smith and Elliot 2006), but ongoing learning and adaptation is recommended by numerous researchers to ensure an organisation remains aware of the environment they operate and how to best succeed in the current conditions (March 1981, Kolb 1984). Raisch and Burkenshaw (2008) and Tushman and O’Reilly (1996) both highlight the benefits of an organisation focusing on current demands, but also in focusing resources on the longer term changing environment. This facilitates longer term success of an organisation. Balancing these requirements can prove difficult for organisations and in the financial industry many people have become focused on exploiting current opportunities and ignoring the changing environment. Minsky’s Financial Instability Hypothesis predicts how people become distracted of excited by the gains they are making during the growth phase and miss the signals that suggest a transition into the Ponzi phase of the process. Interview candidates and numerous authors and researchers note the cycle in the financial industry of ‘short memories’ and ‘this time is different’ where people begin to believe the hype, and the continued growth (Minsky 1992, Sorkin 2009, Nyberg 2013).

The innovations of both complex products and risk management solutions from the late 1990s demonstrated how financial institutions were both creating and adapting a new eco-system within the industry. These complex derivatives grew from an extremely niche corner of the market to an almost dominant and systemically important position (Tett 2009). These innovations resulted in a period of extended and massive growth, but as in previous booms people began to believe the hype. The landscape began to change and many organisations failed to change with them. Their investment strategies were no longer optimal for the environment they were in. Their risk management strategies were inherently flawed, they were precisely wrong rather than broadly right (Haldane 2009). The changing conditions were recognised by a

number of analysts, economists and authors, but their predictions were ignored (Keen 2005, Rajan 2005, McWilliams 2006, Kelly 2006, 2007).

As these organisations had adapted to what they perceived as the fitness peak in the environment they were in, they also reduced their own adaptability and resilience (Gunderson and Holling, 2006). When the risks lying dormant in the system were triggered, they moved rapidly through gaps in defences in many organisations and the complex system tipped into a period of chaos where the required skills for success were briefly undefined, many financial institutions lacked the internal buffers or resilience to weather the storm or the capability to adapt quickly to the new environment. Lehman Brothers collapsed, Anglo was deemed too damaged to be rescued and RBS was salvaged but extensive internal changes and wide ranging divestments were required as part of this process. All candidates interviewed as part of this project acknowledge that another financial crash is an inevitability, the only questions are when and how bad it will be.

Santander were arguably underperforming against the market prior to the Financial Crisis but retained the internal buffers and resilience to weather the storm. Anglo operated with an inherently risky strategy from the early 1990s in order to allow them to compete against institutions considerably larger than them. In a booming market they grew at a rapid rate, but they and other similar organisations also impacted the structure of the system as more and more agencies followed what they perceived to be a successful strategy. In Ireland, Bank of Ireland and Allied Irish Bank began competing directly with Anglo, offering similarly structured loans (Honohan 2010, Interview 6). RBS similarly began to expand their commercial property loans in response to an extended property boom, they also grew their derivative trading in response to boom in that sector (FSA 2013, Martin 2013). Santander maintained their conservative approach, were in a position to leverage the scale they had developed over an extended period and limited their exposure in an industry that has repeatedly proven itself unstable. 93 separate systemic events since the 1980s, a more conservative approach during boom times was proven to be beneficial to the organisation.

This research is dedicated a small sample size of institutions in this period of time, and due to the different markets the three institutions operated in, and the markedly different histories of the organisations a direct comparison of their achievements is potentially a limited and unfair comparison to make. The wider landscape these organisations were operating in was common, but the conditions in which they were operating at in individual level and the decisions

their management had to make were not directly comparable. However, all players in this market had access to the same public information and had the potential to adjust their behaviour at earlier points than they ultimately chose to. Due to the volumes of information in the public domain regarding the Financial Crisis there is ample opportunity for other studies to reassess the experiences of these organisations, and many of their competitors, from a similar perspective and assess if the ideas discussed here hold merit.

Further work in the area of risk management within the financial system could focus on the risks associated with not adjusting strategy in a changing market, and assessing the potential for reputational loss through lower returns when compared against the market. Additional points discussed during the interviews with Santander employees was of internal frustrations during the boom period at the risk averse approach of the organisation, and similar comments were made about the increased volume of regulation, both internally and externally, since the Financial Crisis. An assessment of the risks associated with staff turnover in an industry which rewards institutional knowledge would also offer further insights into pressures within this industry.

Utilising the Fitness Landscape metaphor as a way to assess Complex Systems could equally be applied to a number of other industries or events in order to further identify how directly applicable the concepts from this area are to management under complex and rapidly changing environments. More detailed assessments of this concepts could allow for more explicit recommendations to be made to managers in these institutions to ensure perturbations or phase transitions can reacted to quickly and limit to shift in periods of chaos for individual organisations and industries and also to limit the knock on impacts and spill over into other indirectly related industries as was seen in the case of the Financial Crisis.

Appendices

Appendix I - Glossary of terms

Collateralised Debt Obligation (CDOs)

A type of asset backed security created by bundling together a portfolio of fixed-income debt used to back the issuance of notes. Cash CDOs are created using tangible bonds or other type of debt. Synthetic CDOs are created using credit derivatives. A mortgage-backed CDO may be constructed from 100 - 150 MBSs

CDO Squared

This is a CDO created using tranches of a variety of other CDO tranches as collateral. These can be particularly complicated to value as many mortgages appear in more than one underlying CDO.

Credit Default Swap

A contract between two parties where one party pays the other party a regular fee in exchange for a guarantee they will be compensated in the event of a default on a nominated piece of debt. Similar to insurance but are unregulated and can be purchased in relation to a piece of debt not actually owned by the buyer.

Credit Derivatives

A contract between two parties designed to protect one party in the event of default of an underlying asset. A CDS (above) is a type of credit derivative.

Derivatives

A financial instrument whose value is derived from an underlying asset, generally commodities, bonds, equities or currencies.

Mortgage-Backed Bond Security (MBS)

Bonds issued from a special-purpose vehicle that holds a portfolio of mortgages. Various tranches of risk are issued from this. An MBS may be made up of thousands of individual mortgages.

Special Purpose Vehicle

A shell company created to hold a portfolio of assets and issues securities backed by the same assets. Can be created by a financial institution but remains a separate legal entity.

Structured Investment Vehicle

Often run independently from a bank, with a degree of credit support. Operates similarly to a conduit.

Super-senior Risk

The portion of the CDO with the least exposure to risk.

Tranche

A class of securities contained within a CDO or asset-back security that contains a specified level of risk. Senior tranche (least risky), mezzanine tranche (more risky) and junior tranche (most risk) (Tett, 2009, Crott, 2009)

APPENDIX II - Interview Topics

Section 1: Background information:

1. What is your position within the organisation?
2. What does this role entail?
 - a. Duties / responsibilities
 - b. Who / what departments do you interact with most frequently?
3. How would you view the organisation's approach to Risk Management?
 - a. Do you agree with this approach personally?
4. What is the impact of Risk Management in your position / department on a day to day basis?
5. What is the role of Regulation in your position / department on a day to day basis?
 - a. Frequent reporting internally / externally
 - b. Impact on your ability to do your job?
6. Do you interact regularly with people in other organisations (formally / informally)?
 - a. Organisations within the same industry
 - b. With whom - role / organisation
 - c. Aware of their organisation's approach to RM in comparison to yours?

Section 2: Events surrounding the financial crisis:

1. What position did you hold at the time of the financial crisis (2007/2008)?
2. How do you remember events unfolding?
 - a. Causes
 - b. Reaction within the organisation / industry
3. What was the impact on your role during that period?
 - a. Extra task demands
 - b. extra reporting
 - c. reporting to different people
4. What was the impact on day-to-day operations within the organisation during that period?
 - a. Change in your individual role

- b. Communication - within your department / company-wide / internationally.
 - c. Formal / informal interactions within the organisation
 - i. Morale / Concerns over employment ...
- 5. How were the events managed?
 - a. Was there an existing internal policy for managing events like this?
 - b. Was there any prior training for operating under 'crisis conditions'?
 - i. What constitutes a 'crisis' within the organisation?
 - ii. Who decides when a situation has become a crisis?
 - c. What was done differently within the organisation during this period?
 - i. Who was making these decisions?
 - 1. What division? / Country specific responses?
 - ii. Role of senior management / Mid-level management?
 - iii. How was it communicated to you and others in the organisation?
 - 1. Verbally / email
 - 2. 2 way communication?
 - d. What was the involvement of regulators during this period
 - i. Who do they communicate with within your organisation?
 - ii. How is that information disseminated through the organisation
- 6. What do you think the role of the media was in this period?
 - a. Prior to
 - b. During
 - c. Afterwards

Section 3: Subsequent changes to Risk Management

- 1. To what extent was the financial crisis a watershed in how the organisation views Risk Management?
- 2. Has there been a change in company policy and attitudes since these events?
 - a. Formal and informal interactions
- 3. Changes in role of Risk Management?
- 4. Changes in the governance structure of the organisation?
- 5. Are these changes similar to those made in other institutions that you are aware of?
- 6. Change in the role and approach of regulation in the industry?
- 7. What is your opinion on these changes

- a. Warranted / reactionary
- 8. Do you feel the organisation / industry is better prepared for future crisis events?

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